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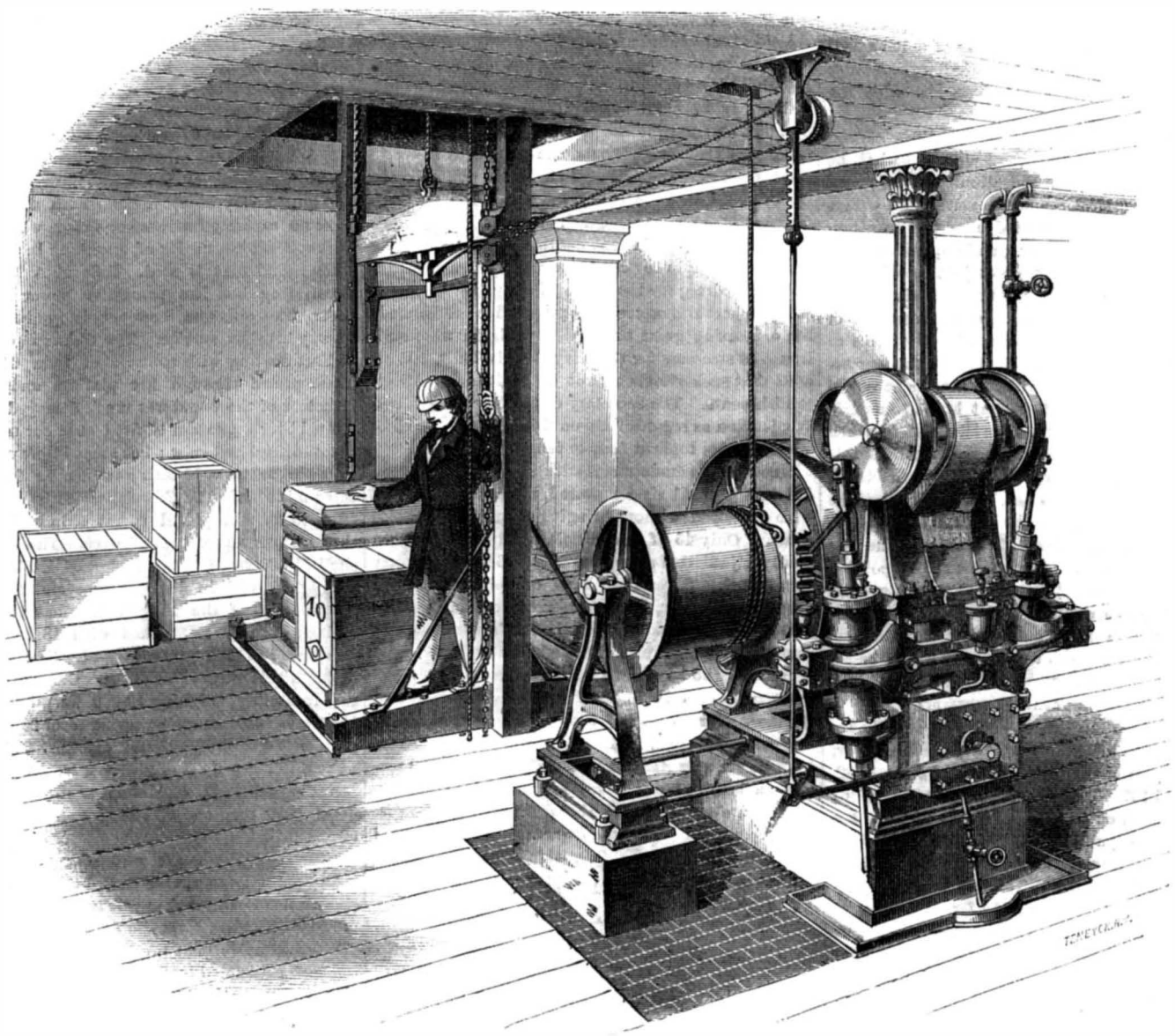

OTIS'S PATENT HOISTING MACHINE.

Improved Hoisting Machinery.

Our engraving is a representation of a very neatly-arranged and practical elevating apparatus made by Messrs. Otis Brothers, of Yonkers, N. Y. It is intended especially for stores and warehouses. It consists of a pair of oscillating engines connected at right angles but working upon the same shaft. These engines drive, by means of a system of belts, pulleys and gearing, the drum which is seen at the left of the engraving. Around this drum a wire rope is coiled which goes to the top of the building and there runs through certain sheaves or pulleys provided for it, and is then attached to the head of the platform on which is merchandise to be raised. The operator may stand on this platform and control the whole machinery through the check chain, which he grasps in one hand (see engraving); this chain goes directly to the long lever attached to the throttle valve working in the steam chest, and by moving this lever up or down, as desirable, the engines operate either forward or backward. Just above the head to which the rope is fastened, there may be seen a ratchet secured to the timbers which guide the platform; this is a very important feature, as it secures the safety of the goods and the lives of persons who may be near in case any accident should happen to the hoisting machinery or rope. By means of a pawl working in this ratchet, the platform is prevented from descending should disaster occur. The arrangement of the engine with reference to the gearing is very good, there being no unnecessary complications. The engines are not in operation except when actually hoisting, consequently there is a great saving of steam as compared with other machines that require a constant motion to be serviceable.

Mr. A. T. Stewart, the great dry-goods merchant of this city, has two powerful machines of this description in his new store on Broadway, one of which is used for elevating goods, the other being provided with an elegantly furnished car in which all his customers may be elevated to the different floors of the store. This machinery is extensively in use by the large mercantile and manufacturing houses of this city, giving great satisfaction. Different styles of the engines, also every kind of safety hoisting machinery adapted to various businesses, are manufactured by the Messrs. Otis Brothers, Yonkers, N. Y., from whom all further particulars may be obtained.

A Large American Diamond.

The art of cutting and polishing diamonds (says the Boston *Transcript*), though of remote antiquity in Asia, has only recently been introduced into this country. It is now practiced here by one house, and only one, we believe, that namely of Messrs. Crosby, Hunnewell & Morse, of Boston, and we need no longer send as heretofore to Amsterdam or London to have diamonds repaired or re-cut. These dealers have now on exhibition at their store a native diamond which they have cut in the highest style of the art. It is the largest diamond ever found in the United States; perhaps the largest now in the country. The weight of the gem before cutting was nearly 24 carats; after cutting it was about one-half its original weight. It was found near New London, in Southern Virginia, in the vicinity of a quarry of elastic jointed sandstone. No exact value has been put upon the gem, but it is estimated as being worth from $10,000 to $15,000.

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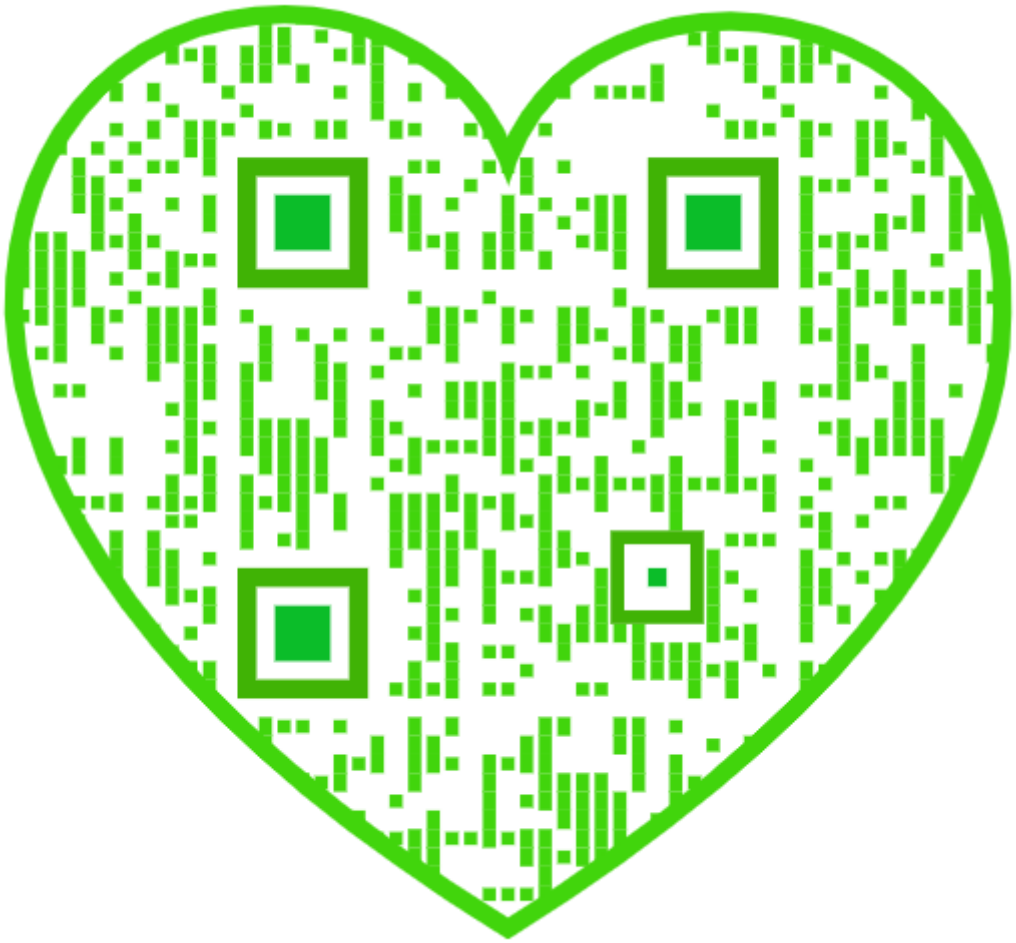

THE PRESIDENT'S MESSAGE.

The President's message is a plainly written, unpretending document, and bears evidence throughout of the sincerity and honesty of purpose of its author. The President has no poetry in his composition, and but little enthusiasm; hence we discover in all his state papers a straight-forward, homely style of argument, wholly stripped of ornamentation and rhetoric. He announces that our foreign relations are in as good condition as we could expect, in view of the deep interest felt by all European nations in the great struggle now going on. In reference to the finances, he presents a hopeful view and recommends that the banking business of the country be carried on under a United States banking law, and that the Government furnish the circulation notes, on security of the United States bonds deposited in the Treasury; the advantage being that, under such a system, a uniform currency would be secured. The President has favored the project of uniting this country with Europe by an Atlantic telegraph, also a similar one to connect San Francisco with the Russian Empire.

"COMPENSATED EMANCIPATION."

The President urges at great length, what he terms "compensated emancipation" of slavery. This important subject seems to override all others in his estimate, hence he devotes much more attention to it than to any other public question. He proposes to inaugurate the great jubilee with the year 1900, by payment of the owners of slaves as a mutual concession on both sides, and as a matter of justice to those who are owners of this species of property. It being quite evident that the war between slavery and freedom will continue to be waged with increased vigor, the President hopes to modify its intensity, by fixing upon a certain period, when the institution shall forever cease. He thinks this policy will shorten the war, and secure justice to all concerned; while, at the same, the country will be saved from the effects of violent and sudden changes in its domestic arrangements. This view of the case strikes us as humane, and if the more radical portion of the two sections would but accept it, as a ground of settlement, peace would again bless us; but so intensely bitter have these contending elements become, that we fear no such compromise would be acceptable or satisfactory.

UNITED STATES TREASURY RECEIPTS.

The receipts into the Treasury from all sources, including loans and balance from the preceding year, for the fiscal year ending on the 30th of June, 1862, were $583,855,247 06, of which sum $49,056,397 62 were derived from customs; $1,795,331 73 from the direct tax; from public lands, $152,203 77; from miscellaneous resources, $931,787 64; from loans in all forms, $529,692,460 50. The remainder $2,257,-065 80, was the balance from last year.

TREASURY EXPENSES FOR THE YEAR.

The disbursements during the same period were:—For congressional, executive and judicial purposes, $5,939,009 29; for foreign intercourse, $1,339,-710 35; for miscellaneous expenses, including the mints, loans, Post Office deficiences, collection of revenue and other like charges, $14,129,771 50; for expenses under the Interior Department, $3,102,-985 52; under the War Department, $394,368,407 36; under the Navy Department, $42,674,569 69; for interest on the public debt, $13,190,324 45; and for the payment of the public debt, including reimbursement of temporary loan and redemptions, $96,096,922 09—making an aggregate of $570,841,700 25, and leaving a balance in the Treasury on the 1st day of July, 1862, of $13,043,546 81. It should be observed that the sum of $96,096,922,09, expended for reimbursements and redemption of the public debt, being included also in the loans made, may be properly deducted both from the receipts and expenditures, leaving the actual receipts for the year $487,788,-324 97, and the expenditures $474,744,788 16.

How to clean Soiled Carpets.—Soiled carpets may be cleaned (after beating) with the following mixture: Two gallons of water, with half a pound of soft soap dissolved in it, to which add four ounces of liquid ammonia; this may be rubbed on with a flannel, and the carpet then rubbed dry with a coarse cloth.

INCREASE AND CONDITION OF THE NAVY—THE REPORT OF THE SECRETARY.

The annual report of the Secretary of the Navy is very long, and in some features, needlessly minute. As it regards the past and present condition of the navy the contrast is striking. In March, 1861, there were only 74 vessels belonging to the navy, of which 42 were in commission. With those vessels in service and those now being constructed, the number is 427. Of this number 180 have been purchased, the others have been and are being built. The tunnage of the 427 ships amounts to 340,036 tuns; their armament, 3,269 guns. Of the whole number there are 104 sailing vessels and 323 steamers. As it respects the iron-clads, we are informed that there are 20 armored iron vessels and 8 armored wooden vessels intended for sea, and 26 armored vessels for the western rivers, making a total of 54 vessels, mounting 261 guns. This armor-clad fleet looks formidable on paper, but there are only four of these vessels for salt-water service in commission, namely, the *Monitor*, *Galena*, *Ironsides* and *Passaic*.

Contrary to opinions expressed by several shipbuilders and marine engineers respecting the inefficiency of the new gunboats, the report says:—"No vessels were ever constructed on better terms for the Government, or have better subserved the purposes for which they were designed, than the 23 gunboats for which the department contracted on its own responsibility at the commencement of hostilities, without waiting for the action of Congress."

The report recommends appropriations to be made for organizing great naval dockyards, in which all iron-clad steamers for the navy shall be built. It asserts that such vessels cannot be built in private establishments. The Secretary of the Navy is evidently mistaken as regards facts on this point. We shall allude to this topic at further length next week.

Since the blockade was instituted there have been 543 vessels of all sizes captured, a number of which were destroyed without bringing them before a prize court. Only 45 of the vessels captured have been finally adjudicated upon, and $554,176 in prize money distributed. Several millions of dollars' worth of property, however, have been captured, and the report should have added that the lion's share goes to commissioners, lawyers, &c., and the moiety to the brave tars who have done the hard service.

A naval depot for building and repairing iron-clad steamers for western waters, is recommended. England is censured for fitting out the notorious Confederate steamer *Alabama*. There are now 28,000 seamen on board of our naval vessels, and 12,000 mechanics are employed in the different navy yards. The expenses of the Navy Department for the fiscal year have been $42,200,529, which leaves an unexpended balance of last year's appropriations amounting to $1,415,021.

ORDNANCE DEPARTMENT—GUNS AND IRON-CLADS.

Captain J. A. Dahlgren, chief of the Ordnance Department, has presented a long report to the Secretary of the Navy, from which we condense some interesting information. He states that there is now a prospect of obtaining a considerable amount of niter for the manufacture of gunpowder, from our own resources, but the chief supplies for the whole world are still in the hands of the British, and are obtained from the East Indies. There are seven private establishments fabricating cannon for the navy, viz:—Knapp & Rudd, Pittsburgh, Pa.; Alger & Co., Boston, Mass.; R. P. Parrott & Co., Cold Spring, N. Y.; J. Sparrow, Portland, Maine; Hinckley & Williams, Boston, Mass.; Z. Chaffee, Providence, R. I., and Seyfert & McManus, Reading, Pa.

IRON-CLAD SHIPS.

The use of solid shot fired from 42-pounders at sea, ceased at the battle of Navarino. After this Captain Paixhan introduced shells. The terrific effects of these were first really displayed at Sinope, by the Russians. In 1855 the French first used three iron-clad vessels at the Kinburn forts, and none of the Russian shot was able to pierce the plating. The first sea-going iron-clad frigate built was *La Gloire*, and England soon followed the example with the *Warrior*. These are large vessels, of great draught The American coast being mostly shoal requires vessels of light draught, hence they are inaccessible to heavy iron-clads like the French and English frigates. Vessels of the *Monitor* and *Ironsides* classes are likely to suit our present purposes. Captain Dahlgren states that Whitworth first demonstrated that thick iron plating, backed with wood, could be pierced with shells. The 11-inch guns of the *Monitor* were chiefly designed for shells, which were computed to have an initial velocity of about 1,120 feet per second; but this class of gun is capable of throwing 169-pound solid shot with 30 lbs. of powder, and an initial velocity of 1,400 feet per second. The *Merrimac* was armed with 9-inch guns; their shot did no material damage to the *Monitor;* the damage which the shot of the latter effected is not known. The wrought-iron shot furnished to the *Monitor* weighed 186 lbs. If fired with 15 lbs. of powder, their initial velocity would only have been 1,050 feet per second. The *Monitor* only fired 42 shots at the *Merrimac*, and many of these failed to strike, from the difficulty of aiming with precision. The *Monitor* and *Galena* failed to make any impression in the attack on Fort Darling, on the James river, because their guns had to be so much elevated.

GUNS FOR IRON-CLADS.

Rifled shot is the most accurate at long ranges, but when they strike and are deflected, they tumble over and have a very erratic flight. Such shot, therefore, have no capacity for ricochet firing, which is one of the most certain modes of operating in naval service when round shot is used. Rifle shot have greater penetrating but less percussive power than round shot. The rifle gun, however, is gradually making its way into the service. The *Galena* was fired upon at Fort Darling with round shot from 64-pounders. These passed through her plating, and the entire structure of the vessel was much damaged.

An 11-inch gun can be fired once per minute with a well-disciplined crew; but some improvement must be made before a 15-inch gun can be fired once in three minutes. The *Roanoke*, which is being converted into an iron-plated turret ship will be able to throw 2,700 lbs. of shot at once. The effect of her shell of 330 lbs., and solid shot of 450 lbs., from 15-inch guns, will be damaging beyond former experience. One of the 15-inch guns has been tried on 5½-inch iron plates backed with 18 inches of oak, and placed at 200 yards distant. The shot passed through this target with ease. One of the 11-inch cast-iron guns (weighing 16,000 lbs.), has been fired 155 times, with charges varying from 20 to 30 lbs. of powder and shot of 165 and 169 lbs. This gun does not exhibit any signs of giving way. A great number of experiments with these cast-iron guns afford proof that they are as strong and durable as the forged British guns.

COAST DEFENSES.

Capt. Dahlgren states that batteries of masonry should not be exposed to rifle cannon. The exterior of stone and brick forts should be covered with iron. The low stone forts at the Narrows of New York are not well calculated to hinder the passage of an iron-clad vessel. The earth works on a high elevation are superior. Steam rams will be of little use, unless their speed is greater than that of other vessels. Floating iron-clad batteries should be employed to assist forts in case of an attack by iron-clad frigates.

The Post-office Department.

From the report of Postmaster General Blair, we learn that the condition of the Post-office has greatly improved. The gross revenue for the fiscal year was $9,012,549; the expenditures $11,125,364. Expenditures for 1860, for service in all the States, $14,874,-772 89; revenues for the same year, $9,218,067 40; deficiency, $5,656,705 49; expenditures for 1861 (service interrupted in 1861), $13,606,759 11; gross revenues for 1861 (service interrupted in 1861), $9,049,296 40; deficiency, $4,557,462 71; expenditures for 1862, $11,125,364 13; revenues for 1862, $9,012,549 56; deficiency, $2,112,814 57; reduction of expenditures as compared with 1860, $3,749,408; reduction of expenditures as compared with 1861, $2,481,394. There has been a great reduction of expenses while the income is nearly equal to what it was before the disruption of the Union.

Castoroil dissolves like a resin in pure alcohol, and it is used in this combination as a hair lotion.

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Incrustations on Boilers---Scum Pipes---Surface Condensers.

The following exceedingly useful and practical remarks are condensed from a late monthly report of L. E. Fletcher, chief engineer of the Manchester Association for the Prevention of Steam Boiler Explosions, and published in the London *Mechanics' Magazine* :—

The number of boilers under inspection which suffer from incrustation is very large ; indeed, to escape this inconvenience is quite exceptional. It forms a considerable impediment to satisfactory inspection, since it renders it difficult to ascertain the actual condition of the plates ; it sometimes gives a delusive appearance, and leads to undue suspicion of corrosion, but more frequently it conceals defects, since corrosion is often found to be going on under, and to be caused by, the deposit.

In addition to the waste of fuel occasioned by incrustation, the wear and tear of boilers is considerably increased, apart from the effects of over-heating. Thus internally double ed boilers suffer from the undue longitudinal expansion given to the furnace crowns, which increases the tendency to groove at the front end plate, an action always more or less developed in these boilers, while incrustation renders the use of tubular boilers altogether impracticable in localities not supplied with good water, and thus prevents the more general use of this economical class of boiler.

Although the danger of allowing incrustation to form on plates exposed to the action of the fire is too fully appreciated to need remark, the fact is not so fully recognized that, even where no actual cake of deposit is formed, over-heating frequently occurs. It is thought that this may, in many cases, be due to the presence of thickening matter held in suspension in the water, and it would be interesting to ascertain by experiment whether the impediment thus presented to the free escape of the steam does not—where the circulation is imperfect, or no such agitation of the boiler takes place, as in locomotives when running—lift the water off the plates, and thus cause over-heating. Of the fact of overheating occurring where no incrustation is formed, and with an ample supply of water in the boiler at the time, there is no doubt ; instances are constantly coming under notice, and it may be added that they are chiefly found to take place in boilers externally fired.

Apart from the injury done to the boilers from incrustation, a considerable amount of earthy matter passes over with the steam into the engines, and thus renders necessary the use of an increased amount of tallow for the piston and slides. This, though too frequently lost sight of, is illustrated by the fact that where boilers are fed from brooks, subject, on heavy rains to sudden torrents which stir up the mud, the engine attendants are in the habit, at such times, of taking the precaution or giving the engine cylinders an extra amount of lubrication, finding the pistons, &c., to clog when this is neglected.

Under ordinary circumstances, the most practical plan for the prevention of incrustation is the adoption of an efficient mode of "blowing-out," and not the use of "boiler-compositions." To blow out, however, from one point only, at the bottom of the boiler, which is the general custom, has but a very limited and local effect. This is frequently remedied by the adoption of a perforated pipe, which is connected to the ordinary blow-out trap, and carried along the bottom of the boiler from one end to the other. These are technically termed "Topham pipes," from the name of the patentee, and are generally spoken highly of by those of our members who have adopted them. They are, however, more successful where the sediment being heavy and sludgy falls to the bottom, rather than where it is of a lighter character, which frequently forms the hardest and most tenacious scale.

From the rapid ebullition that takes place within boilers when under steam, it is found that a greater part, if not the whole, of the sediment set free by evaporation rises to the top of the water, forming a coat of scum, before finally depositing itself upon the furnace tubes or shells ; and thus the readiest way of preventing incrustation is to blow out this layer of scum from the surface of the water by means of a scum pipe, before it has an opportunity of setting There is nothing new or experimental in this ; the system has been for years adopted with marine boilers, and there is no reason why its use should not become equally general with stationary ones. Many of our members have already tried it with considerable success, and find, on opening their boilers after a month or six weeks' work, that where they used formerly to be coated with a heavy muddy deposit they are now perfectly clean.

The general adoption of scum pipes is, therefore, confidently recommended to the members, not only for the prevention of incrustation, but also, in order to lengthen the lives of their boilers, as well as to assist the engines in many cases, by preventing priming.

The most radical cure for the prevention of incrustation, though one involving considerably more outlay, at the first, than the above, will be found in the adoption of dry or "surface condensation," by means of which the boiler is fed with distilled water, the same being used again and again, with the exception of the slight amount lost through leakage. To those who are paying large amounts annually for a supply of town's water, and where the steam is consumed for engine purposes, the adoption of surface condensers is well worthy of serious consideration, not only on account of the saving in the water rates, but also in that of fuel, since non-condensing engines may, by this means, be converted into condensing, which is not at present generally the case where town's water is used.

THE "GREAT EASTERN."

This, the greatest ship of ancient or modern times, has been in some instances very unfortunate, but all the mishaps which have befallen her, have proven beyond a doubt that in the principles of her construction she is matchless, and in strength she is unequalled by any steamer afloat. She has now been lying in Flushing Bay, near this city, for several months, undergoing repairs caused by an accident, not from mismanagement of her officers, but by striking a rock not laid down in the chart, when she was "hove to" for a pilot off Montauk Point. It was stated, at the time this took place, that the amount of damage was small, but upon a thorough examination it was found that 85 feet in length of the plating was fractured, and in some places it was four feet in width. This accident has demonstrated her superiority of construction. It will be remembered that she has an outside and inside skin, and is like one vessel built inside of another, with a space of two feet between the skins. Now, although the outside plating was so much injured, the inside skin was untouched, and she carried one thousand passengers and two thousand tuns of merchandise to their destination without damage. No other vessel in the world, we think, could have done this. It is even believed by several persons, that she could have recrossed the Atlantic without repairs, but it was thought best not to run any risk.

The *Great Eastern* has not yet been fully repaired, as a peculiar coffer-dam had to be constructed to get under her bottom ; but the chief cause of delay has been the inability to obtain proper plating, on account of all the rolling mills being engaged on Government work. A submarine lamp, which gives a clear light at a considerable depth under water, has been used, with much satisfaction, in surveying the bottom of the *Great Eastern*. The last two voyages of this noble steamship between Liverpool and New York, were quite successful and remunerative, and they were the most regular ever accomplished by any one steamer. In an early number we shall give fuller details of the means used to repair this vessel. We hope she has yet a long and prosperous career before her.

A NOVEL ENVELOPE.—We have received from William P. Lyon, of No. 537 Pearl street, this city, samples of the novel envelope that was patented by Leeds & Franklin and illustrated and described on page 32 of the present volume of the SCIENTIFIC AMERICAN. This patent envelope has a simple window opening at the right hand corner, through which, by use of the postage-stamp, the letter and envelope are sealed fast together ; so that when the letter is removed from its cover, the postage-stamp, with the post-mark placed thereon, must remain permanently adhering to the letter.

Rice.

Rice is the favorite grain-food of the people of India ; but except in Arracan, and a few other districts in which it constitutes the chief and almost only article cultivated, its use is confined to the richer classes throughout the country. Millet constitutes the chief grain-food of a considerable portion of the people.

In the last four years the export of rice from India to different countries has ranged in value from £2,500,000 to £3,500,000 sterling. The average annual export of rice from Arracan during the last eight years has been—to Europe, 112,000 tuns ; to the East and Indian ports, about 4,000 tuns. The wholesale price of rice varies considerably according to the demand ; formerly it could be purchased at from £2 10*s*. to £3 10*s*. the tun. The average rate for the last ten years may be set down at £5 per tun.

In consequence of the rise in the price, China and other Eastern countries have been nearly driven out of the market.

The Burmese recognize nearly a hundred varieties of rice ; but the principal distinctions between the different kinds are as follows :—hard grain, soft grain, glutinous rice.

The Natsieng is the hardest grain and is the rice which is accordingly principally shipped to Europe. The Meedo is the chief of the soft-grain varieties. It is much preferred by the Burmese to the hard-grained sorts, and it is certainly superior in taste when cooked ; but the hard-grained rice is chiefly purchased by the merchants for export, as it keeps better, and the soft-grained rice is too much broken by European machinery in cleaning. Latterly, on the continent, this last objection appears to have been overcome, and a greater demand is consequently springing up for the Meedo rice for the markets of Europe.

The Koungnyeen or hill rice is called glutinous rice by Europeans, from the property it possesses, when cooked, of the grains all adhering in a thick, glutinous mass. It is the chief article of food with the hill tribes, but is not much eaten by the inhabitants of the low, swampy plains, where the common rice is grown. The price of rice in the husk, in Burmah, is about £5 the 100 baskets of 52 lbs. ; of cargo rice, £4 10*s*. the 100 baskets of 63 lbs. ; and of cleaned rice, £7 10*s*. the 100 baskets of 70 lbs.

Rice is used as food for man, beast and bird, for the manufacture of starch, distillation of spirits, &c. Its varieties are as numerous as its uses.—*The London Grocer*.

Sorghum Wine.

Mr. A. Myres, of Springfield, Ohio, brought to our State Fair, a specimen of wine fermented from sorghum which may become a general beverage, when once manufactured in sufficient quantities. It is a clear dark red in color, with a taste and flavor between sherry and ripe, fruity madeira. The acid in it is very slight, not more than in good sherry, while it has a body and richness, more near resembling fine old madeira than anything else we can think of. But its flavor is not its only quality likely to make it popular. It is cheap. It can be made and sold for five cents per gallon ! The sorghum stalk is used for sugar or molasses as fully as possible, and the wine is then made from the refuse, the crushed and juiceless splinters. It is made only of that cane which has yielded all the sugar it contains. The quantity obtained, Mr. Myers states, is about one barrel of wine for every ten of molasses, using only the refuse after the molasses is made. This discovery will undoubtedly prove universally and rapidly successful.—*Indianapolis (Ind.) Journal*.

THE *Prairie Farmer* says that we are in a fair way to obtain from sorghum a valuable material for the manufacture of paper. A paper mill on the Fox river, Ill., is already using considerable quantities of it in the manufacture of wrapping paper, and is putting in the necessary machinery for preparing it for printing paper. When completed, it will use from two to three tuns of sorghum per day.

GUM-SHELLAC can be dissolved in alcohol and in an alkaline solution.

INDIA-RUBBER is soluble in the benzine of petroleum and naphtha.

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WARMING AND VENTILATION OF BUILDINGS.

A perfect system of ventilation combined with a suitable method of heating houses, adapted for our warm summers and severely cold winters, is a desideratum. Various theories of ventilation have been propounded and several modes of heating dwellings have been applied, but numerous complaints have been made against most if not all of them. In such a variable climate as that of North America, we may question whether the systems which have been applied in Europe and transferred to the New World are at all suited to the circumstances. In accordance with such a view of the subject, a new and beautifully-executed treatise by the Hon. Henry Ruttan, of Canada West, has lately been published by G. P. Putnam, of this city. Its object is to illustrate and disseminate a more general knowledge of the author's system of warming and ventilating dwellings, upon what is called "the exhaustion principle," which has been applied with much success on the cars of several railroads. Ventilation means the supplying of apartments with fresh air. This is necessary to health and existence. We live at the bottom of an ocean forty miles in depth, called the "atmosphere," and at every respiration we drink into the lungs a certain quantity of this atmosphere, the oxygen of which combines in definite proportions with carbon in the blood, which is driven out into the atmosphere as carbonic acid gas. This gas diffuses itself through the air and cannot be inhaled in noticeable quantities without producing as disastrous results to the animal system as the inhaling of gas from burning charcoal. It is therefore necessary that all such "foul air" as it is called, should be removed from apartments, and its place supplied with fresh air. In warm and temperate climates this is easily effected by simply opening the window. But the problem of ventilation is far more complicated in cold climates, where the air ranges in temperature from one hundred to one hundred and thirty degrees below blood heat. In such cold regions the houses require to be almost sealed against the air without, while at the same time the air within them must be heated artificially. In such cases a portion of the warm air within apartments must be constantly removed and an equal weight of cold fresh air from without admitted. On the subject of heating different houses Mr. Ruttan states that the difference of locality and size of different apartments in houses is so great that it is utterly impossible to lay down any rule in the generation of heat, but he gives the following advice as derived from experiment, respecting the heating of rooms in relation to their depth between the ceiling and floor. He says: "People are generally impressed with the idea that it is the ground area or lateral measurement of a room by which they are to be guided in arranging for its warming but this is not correct; it is the hight by which they should be chiefly governed. When I tell you that it takes about double the quantity of fuel to warm a room twelve feet high, that it takes to bring one of the same lateral measurement and ten feet high to the same temperature, you may be surprised, yet this is a fact which I have proved by many experiments." In another place he says: "We must have no rooms over ten feet high, and nine feet would be better, except in the cases of churches and theatres, where special provision is made for warming. I know there will be strong opposition to any such proposition, for hitherto high ceilings have been looked upon as a sort of substitute for ventilation, and as the need of ventilation was felt more in cities than in the country, the ceilings of apartments were made higher there, and from this it has grown into the fashion. But if thorough ventilation can be secured, the great advantage a low ceiling possesses over a high one in the saving of fuel, as well as in the rapidity of a change of air, will, I think, induce those people who are governed by common sense to adopt it. That this thorough ventilation can be secured there is not a shadow of doubt."

Mr. Ruttan advises that every house should be provided with double windows. Dr. Wyman, who has ably written on this subject, states that a current of cold air always descends over a window, and this is often mistaken for air coming in from the outside. He says: "The unpleasant effect of this fall of air from a number of large windows, as in churches, and their great influence in lowering the temperature of a room, is much greater than is usually supposed, especially in buildings heated by warm air, when the walls do not feel the influence of radiated heat. In our New England climate, where the temperature not unfrequently approaches zero, and is often below the freezing-point, there would be a vast saving of heat if our churches, court-rooms and other public buildings could be preserved from this cooling process. This can be done by means of double windows fitting closely and inclosing between them a quantity of air."

This is undoubtedly a correct view and is generally acknowledged to be so, because a stratum of air is one of the best known non-conductors, and a double window secures such a non-conducting medium. With respect to windows, Dr. Reid, another able writer on heating and ventilation, also says: "A window is always a source of descending currents which take place independently of any influx of cold air. These currents are a common source of discomfort and disease, particularly rheumatism, colds and inflammation."

As it respects the forms of hot-air furnaces, Mr. Ruttan asserts that those manufacturers who increase the heating surface of their productions by pipes, corrugated or otherwise, act upon unphilosophical principles. The best shape of an "air-warmer" for buildings he says "is that which presents the greatest surface to the center of the fire, and that being globular, this is the form most efficient and economical for warming houses by air." And to sum the question of heating up, he says: "If we want our houses warmed and ventilated, we must supply a brisk and easy flowing body of air. . . . The air should pass out of the room at about 60° temperature, and this will make it necessary to take it from the "air-warmer" at 90 or 100 degrees in an ordinary winter's day, and with an ordinary sized house, say 40 feet square. In a very cold day when the air is liable to lose its heat much faster from the increased cooling of the walls, the warm air should be brought in at a somewhat higher temperature. . . . There is a great advantage in being able to bring in the warm air at that comparatively low temperature as thereby all danger of injuring it by overheating (as is often the case with hot-air furnaces) is prevented."

By the common mode of heating and ventilating buildings by means of hot-air apparatuses, the cold air is taken in from below and the warm air let out above. In churches, houses and other buildings the furnace or heater is placed in the basement and the warm air is conducted upward through openings in the floors. By this system the upper stratum of air in rooms is frequently too warm while the stratum near the floor is quite cold. As the feet of persons are most liable to become cold, it is more necessary to have warm floors than ceilings to obtain the greatest amount of comfort. By the Ruttan system this is secured in a peculiar manner, which may be called the inverted syphon method. To give a general idea of it, suppose there are three rooms placed above one another, and that the two upper ones have floors laid with an open space of a few inches wide extending along their sides. A chimney or shaft extends from the basement in the usual manner, but has only one opening inside and that is below the lower room floor. This opening is covered with a sliding door, and no air can get to the outside, except by passing through this door and up to the top of the chimney. Now, supposing warm air is admitted from the heater by openings in the ceiling of the upper room (the very reverse of the common method), no current will be produced while the door of the chimney in the lower space or apartment, is shut; but whenever this is opened, the warm air presses downward, passing through the spaces along the sides of the floors, then through the opening in the chimney and up thence to the atmosphere outside. By this ingenious method a natural draught is produced; the warm air is taken in from above, carried down through the floors, and from thence outside sweeping all the foul air with it. It will be understood that warm fresh air is admitted constantly from above. When air is heated in a room to 75.46 degrees above that of the atmosphere outside, its pressure is increased two pounds on the square inch. We may judge from this of the expansive force which it possesses to produce a downward draught through rooms to the opening in the shaft below, thence to escape into the atmosphere. By this method of heating and ventilating the stratum of air near the floors of apartments is maintained at the same temperature as that near the ceilings, and indeed the temperature in every part of the room will be nearly uniform. In apartments constructed to carry out this system, the floors which are laid with an open space of a few inches along the sides have a perforated "base-board," which may be of iron and of an ornamental character. It is now eleven years since Mr. Ruttan first brought his system to the notice of the public through the columns of the Scientific American on page 297, Vol. VI. (old series), and he has devoted nineteen years in experimenting and has at last ventured to lay his system with his experience before the world in the form of a book. It contains much useful information respecting the construction and arrangement of buildings, besides illustrated descriptions of his heating and ventilating system. Many persons have heard of this system as applied to cars n several of our railroads, but few are acquainted with its principles. The description which we have given of it will impart a general idea of its nature, which deserves to be more widely known than it has been hitherto.

The Turn of Life.

Between the years of forty and sixty, a man who has properly regulated himself may be considered in the prime of life. His matured strength of constitution renders him almost impervious to the attacks of disease, and experience has given soundness to his judgment. His mind is resolute, firm, and equal; all his functions are in the highest order. He assumes mastery over business, builds up a competence on the foundation he has formed in early manhood, and passes through a period of life attended by many gratifications. Having gone a year or two past sixty, he arrives at a standstill. But athwart this is a viaduct, called the "Turn of Life," which, if crossed in safety, leads to the valley of "Old Age," around which the river winds, and then beyond without a boat or causeway to effect its passage. The bridge is, however, constructed of fragile materials, and it depends upon how it is trodden, whether it bend or break. G[illegible] and apoplexy are also in the vicinity, to waylay the traveler, and thrust him from the pass; but let him gird up his loins and provide himself with a fitter staff, and he may trudge in safety with perfect composure. To quit metaphor: the "Turn of Life" is a turn either into a prolonged walk or into the grave. The system and powers, having reached their utmost expansion, now begin to either close in like flowers at sunset, or break down at once. One injudicious stimulant, a single excitement, may force it beyond its strength; whilst a careful supply of props, and the withdrawal of all that tends to force a plant, will sustain it in beauty and vigor until night has entirely set in.—*The Science of Life.*

Shorten the Back Legs of Your Chairs!

If you cut off the back legs of your chairs, so that the back part of the seat shall be two inches lower than the front part, it will greatly relieve the fatigue of sitting, and keep your spine in much better shape. The principal fatigue in sitting comes from your sliding forward, and thus straining the ligaments in the small of the back. The expedient advised will obviate this tendency and add greatly to the comfort and healthfulness of the sitting posture. The front edge of a chair should not be more than fifteen inches high for the average man. The average chair is now seventeen inches high for all, which no amount of slanting in the seat can make comfortable.—*Lewis's Gymnasium.*

Conflagrations of Wire Works.—The wire works of Washburn & Sons, of Worcester, Mass., were burned quite recently. The loss amounts to $60,000 or $70,000. The mill was running its full capacity day and night, and the proprietors had sufficient orders to last until April. A large number of hands employed in the Norway Works, South Boston (which were destroyed by fire on Tuesday, Nov. 11), had obtained new situations in this manufactory, and it is a little singular that both these establishments, now burned, were formerly owned by Mr. Henry S. Washburn.

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DOMESTIC ECONOMY.

There is no more intensely interesting subject, among the many questions of the day, than the great problem of domestic economy. How to live well and comfortably, and yet cheaply without descending to niggardliness, is and has been the study of wise men and philosophers in all ages. Certain writers upon the subject, and, indeed, many thinkers and travelers who have had opportunities for observation, persist in declaring that the French people, as a class, are models of prudence and domestic skill; not only in improvising dinners out of what to other nations would be a beggarly bill of fare, but also in the introduction of a peculiar system in their relations with small dealers, whereby any infinitessimal amount of their various wares can be obtained as desired. Such assertions are erroneous so far as they are confined to Paris, that city being selected as an instance of this particular kind of domestic organization. Subjoined is an extract from a very interesting letter of the Paris correspondent of the *Commercial Advertiser*:—

There are few American families who know exactly the expense of a year; they all know, probably, that it costs about so many hundred or thousand dollars on the whole. But every European family knows the expense of every year, of every month, day or hour—the exact cost of every dinner, supper or breakfast, of every morsel they eat, of every drop they drink. Every German or French housewife knows not only how much the meat, potatoes and bread of any meal has cost, but also the water in which she has cooked them, and the coal or wood she has burned to boil the water.

In Paris the fountains of the city belong to the government, and the water is sold by barrels and pailfuls to water-carriers, who supply families at so much a gallon. In a house of five stories there are two families on each floor, making ten who ascend the same staircase, up which all articles for family use must be carried. In every kitchen is a receptacle for water, consisting of an oblong box, containing two or more pailfuls, according to the means of the family and their ideas of cleanliness. In one corner of the box is a small portion of porous stone, which serves as a filter, and to which is a separate faucet. The *porteur* brings two large pailfuls of water for three cents, and comes every morning. It is, therefore, very easy to know how much the water costs in which the dinner is boiled.

In the same kitchen is a box for coal, which contains the quantity for which they pay forty cents, and they know exactly how many meals can be cooked with this quantity. If they have guests to dinner, they use an extra quantity of water and coal, and know how many cents worth are devoted to each guest, and then of course they know if they can afford to invite anybody again.

They know as exactly how much of every article is used every day. The streets of Paris are lined with small groceries, where everything is purchased by the cent's worth. They keep coffee—burnt and ground, sugar—powdered and in lumps, tobacco, liquors, and every household article ininfinitely small quantities.

The morning meal in every French family is bread and coffee, and is made of equal portions of coffee and chickory placed in a biggin, upon which hot water is poured so long as it runs through black; of this they take two spoonfuls to a half-pint of boiling milk. Three or five cents' worth of coffee is purchased every day, and the milkman and baker of course come every morning. The second meal is at noon, though it is called breakfast, and is merely a luncheon, cold, or the remnants of yesterday's dinner, For these two no cloth is put upon the table, and all ceremony is unnecessary. The dinner is at six and consists of meat and one vegetable, and something as a salad. The salad is dressed with oil and vinegar, the rule being a spoonful of vinegar to three of oil, with pepper, salt and mustard, also a little onion and garlic. The commencement of dinner is of course soup, as this is invaluable in every continental family. There are also soup shops, where a pint or a quart can be purchased every day, between 4 and 6 P. M. But as often as once or twice a week they have a boiled dinner, what they call *pot au feu*. In America the liquor in which meat and vegetables are boiled for such a dinner is thrown away; it must certainly contain the best juice of the meat, and be very good and nourishing. In Europe it is every drop saved and eaten. They fill an earthen pot with meat and vegetables, never omitting the onions, and let it boil away one-half. For the soup they season it with pepper, and sometimes with sorrel, parsley and other herbs and spices, and thicken it with vermicelli or crumbs of bread. Whether it is delicious or not, it certainly seems too good to throw away. American housewives, who may be obliged to practice economy, can at least try it. Children may be taught to like it, and must not be told it is an institution of economy merely.

The desert is almost invariably bread and cheese in winter, with a little confiture. I do not mean to say that every family lives in this way, but I have been in many and seen little difference. One is expected to take a bit of cheese about an inch square and a teaspoonful of confiture. The little shop windows are also lined with jars of preserves, which are sold in quantities of two or three cents' worth, like anything else. Cheese in the same way, a bit a few inches square for dinner. The pepper and salt are no exceptions to the three cent rule—little three-cornered papers being the only receptacles for them. Cinnamon, cloves, nutmeg and similar spices have no location in a continental family, where they never make a pudding or pie or cake of any description, and where they would consider it the greatest extravagance to eat such things. I am talking of families who have a regular income of $600 or $800, $1,000 or $1,500 a year. Such a family does not allow the whole expense of the table to be more than $8 or $10 a month each person, and I know those who limit it to $5 or $6, and yet who live very comfortably.

It will perhaps be a piece of news to many of our residents to be told that the same habits of living are practiced in this city to a greater or less extent. Not only are there little stores on the eastern side of the city, where the necessities of life can be purchased in small quantities, but the houses are rented in a similar way, with the exception only of the *porteur* or janitor. We think, however, that the letter-writer is mistaken in saying that Americans, as a people, do not know the cost of living. So far as our acquaintance extends, they are all, as a matter of business, fully cognizant of the yearly or even daily outlay required to feed a given number of mouths. Even at the extremely high prices which now prevail for every sort of provision, the monthly outlay will not reach the average estimate fixed by the writer alluded to. He says, for instance, that a family in the receipt of $1,000 or $1,500 per annum, with a very wide margin, however, for less incomes, does not allow the cost of maintenance to be more than $8 or $10 a month *per capita*, and who still live comfortably; this they do without any of the "essentials" of life—spices, pastry and cake. We will offset these latter items against the wines which the French drink, and then see how the account stands. If each person should consume $10 or even only $8 worth of food a month, the cost of support alone, in a family of from four to six adults, would be from forty to sixty dollars. This cannot be called cheapness, if, indeed, it is economy. It may be that the relative prices of all sorts of food are greater in Paris than with us, but even this supposition would hardly account for such large figures. With an income of $1,500, it would seem to be a serious matter to pay nearly one-half of it to keep an ordinary family alive.

Let us look at our own side of the question, the difference in the mode and habits of life being considered relatively. French people are satisfied with a low diet during the earlier part of the day, while the necessities, or those habits which we have been educated to consider such, require stronger dishes than bread and coffee. Animal food, new bread in some shape, potatoes, eggs or fish, these are all constituents of the morning meal; thus, at the beginning of our comparison, the expense is greater; the same features are continued throughout the day. The American diet is more generous and substantial in every way, while its cost is less, or can be made so by proper economy. Locations, however, must exercise a great difference in the value of provisions. A family of four persons can live extremely well on $10 or $12 a month for the whole number, and the bill of fare will embrace butcher's meat of the best quality, fowls, fish, vegetables, pastry and puddings, also spices, pickles, tea, coffee, &c., and the condiments usually consumed, each excellent of their kind. This, it will be seen, is a very different estimate from the French one, in which we think there must be some error. The figures that we have stated are large, for as the family increases in size the cost is, in a degree, diminished—of course in a certain sense; the progression ceases at a point below which it is impossible to get. To follow out this line of argument, it would only be necessary for a number of families to live together; they might then exist for nothing. Our idea is better illustated by a boarding house, where for a stipulated sum, say $16 a month, food, lodging, fire and light is provided; out of this sum the landlord not only secures himself against loss, but also has a margin for profit. It must be borne in mind, however, that our estimates were taken at a period when provisions were sold at reasonable prices; not at the present day, when the extortions of speculators have increased everything nearly two-fold.

Some years ago the press published letters from various parts of the country, bearing upon this subject, wherein the size of the family, whether adults or minors, the number of each and their sex, and the cost per day or month of support, was accurately computed. These letters gave information which it was impossible to obtain in any other way, and which was valuable as showing the social qualities and the thrift and economy of the middle class of our countrymen. We should be glad, particularly at this crisis, to receive brief communications, accompanied by the proper statistics, showing the average cost of supporting life in the various States. Much information of a useful nature can be thus obtained.

Chicago Provision Trade.

Chicago now claims to be the largest pork and beef packing city in the world, as within the last five years she has outstripped St. Louis and Louisville, and even Cincinnati. The following table shows the amount of hogs packed in Chicago each season since 1852–53:—

HOGS PACKED IN CHICAGO FOR TEN SEASONS.

Season.	Number of hogs cut.
1852–53,	48,156
1853–54,	52,849
1854–55,	73,649
1855–56,	80,380
1856–57,	74,000
1857–58,	99,262
1858–59,	185,000
1859–60,	167,918
1860–61,	231,335
1861–62,	514,118

The Chicago *Tribune* says:—How many hogs will be cut here during the season just opened is a matter of mere conjecture at present: but during the past summer there have been erected in this city and on its outskirts eight or nine large houses, and about double that number of small concerns. The capacity for cutting, therefore, is nearly doubled, and it is expected that there will be cut at least 700,000 during the season. Some even place the figures as high as 1,000,000, but this amount is looked upon as an exaggeration. Last season the entire receipts of hogs were 746,667, of which 228,000 were shipped East. The number of beeves packed in Chicago in the year 1860–61 was 25,209; in 1861–62, 55,212. Thus far the present season there have been cut upward of 20,000 head; but the packing will probably be continued at intervals up till next April.

Dome of the Capitol at Washington.

The *National Intelligencer* states that the great dome of the capitol, designed by Thomas U. Walter, and now in course of construction under his direction, is rapidly progressing to completion. The principal frame of the structure has been finished, the ribs of the cupola have been put in place, and the plates, which constitute the outer covering, are being set, and will be finished before the close of this month. After this shall have been done, nothing will be left to complete the exterior of the dome but the construction of the lantern and the placing of the ornaments on the upper windows and around the spring of the cupola. These ornaments are now being cast, and one of them, representing a honeysuckle, has been placed in position, and presents a very handsome appearance. The present hight of the iron work above the basement floor of the capitol is two hundred and fifteen feet, and the hight of the portion yet to be constructed, including the crowning statue, is about seventy feet. The whole quantity of iron received from the beginning of the work up to the present time was about seven and a half millions of pounds, and, according to the estimates of the architect, about eight hundred thousand pounds more will be needed to complete the work. The dome will be crowned with Crawford's gigantic and imposing statue of "Freedom," which is nineteen and a half feet high, and weighs about fifteen thousand pounds. This statue is made entirely of bronze, and is composed of five sections. The entire cost of the statue was about $25,000. The sum of $700,000 has been appropriated by Congress for the dome, the most of which has been expended.

Disappearance of the Truffle in France.

The truffle is said to be disappearing in France. This curious production has neither stem, fiber nor root; and no researches have succeeded in discovering the germs from which they are developed. The truffle will not grow in land that has been manured; it loves a wild, uncultivated soil, enriched only with the rotting leaves of the forest, and demands both moisture and sun for its development. The truffle can only be cultivated indirectly by planting groves of the peculiar species of oak among whose roots it is found.

DISCOVERY OF RICH LEAD ORES.—A vein of lead ore has lately been discovered near Port Jervis, Orange county, N. Y. We have been informed that it contains 80 per cent of pure lead, and that the lode is about six feet wide, eight feet deep, and several hundred yards in length. It occurs in what is called the Oneida sandstone.

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Correspondence

The London Exhibition---Letter of Earl Granville.

[Our Special Correspondence.]

The day for nominally closing the great International Exhibition of 1862 has at last arrived, and in two weeks more the glorious pageant will have passed from public view. I should be most happy if I could give your readers some bright visions of its beauties, its vastness and of the value of its gathered products. All known science, all valued art, all devices ever known or practiced by savage or civilized communities have been represented here, and in quantity and quality that has exceeded the powers of examination by any one individual or the comprehension of any single mind. The most skilled engineer and mechanician in passing hundreds of machines and appliances must ask what are their objects, and the most learned in art and science would fail to give a fair description of the use and fabrication of many of the specimens he meets with. This very vastness, under the burden of almost endless duties in bringing the American contributions fairly before the visitors to the exhibition, has made me but a sorry correspondent. Even had I been better qualified for the task, I am gratified to know that other writers have given valuable details which you have found space to give to your readers, and I feel gratified that you have, week by week, had a good and encouraging word for the few of us who, in spite of all the adverse circumstances, have tried to prove to the world that we yet have a country, and one too in which the arts of peace and civilization have a habitation, and that our people are not practicing war as a pastime or a trade, but from most dire necessity.

When I think that possibly, yes probably, there would have been no direct representation of the United States productions of art or manufacture in this exhibition had I yielded to the expressed fears that it would at best be a failure, and now that I know it has been a success as a national representation (as far as it goes) of Yankee industry and skill, I am proud that I braved all threatened dangers and for once defied the warnings of my own pocket, even though I have thrown into the scale an active year of my life entirely uncompensated, and am looking to prospective earnings to carry me back to my duties at home.

Favored by the support and influence of Col. B. P. Johnson, our commissioner, I have been enabled to open, through the favor of the royal commissioners, the way by which our exhibitors might occupy the space luckily found for us at the latest hour, or it would have been impossible to have granted room for our contributions. That I have performed the duties thus accidentally thrown upon me as well as thousands of others would if they had assumed them, I am not vain enough to believe; but that I have given a large share of energy and time will not be disputed by those daily present. And while among exhibitors some will grumble and find fault, I shall pass out of this 220 days' constant attendance at the building with the consciousness that my best efforts have been impartially given to promote the general interests of our exhibitors and our country.

That we have been kindly received by the royal commissioner and afforded every facility consistent with their rules I am happy to record, and it will be among my regrets to leave some of the kind and dear friends with whom I have been officially connected. I inclose a copy of a letter from Earl Granville to our commissioner for your perusal.

JOSEPH E. HOLMES.

London, Nov. 1st. 1862.

INTERNATIONAL EXHIBITION, 1862.

HER MAJESTY'S COMMISSIONERS—The Earl Granville, K. G., Chairman; the Duke of Buckingham and Chandos; Sir C. Wentworth Dilke, Bart.; Thomas Barring, Esq.; Thomas Fairburn, Esq.; F. R. Sanford, Secretary.

To the Commissioner of the United States:—

DEAR SIR:—Although the concluding ceremony of the Industrial Exhibition will not (as you have been already informed) take place until the month of January next, I cannot allow the day on which the building is virtually closed to the public to pass away without congratulating you, in my own name and in the name of my colleagues, on the results that have attended the labors of your commission, to the several members of which we beg to offer our cordial thanks for the invaluable assistance which they have rendered to us in carrying this great undertaking to a successful issue.

We received, in the first instance, with much satisfaction, the announcement of your nomination by your Government to represent the interests of your country; and now, at the close of the exhibition, we cannot express too warmly our gratitude for the manner in which, while loyally maintaining those interests, your commission has supported us in our endeavors to promote the general efficiency and success of the exhibition. We have, however, much pleasure in thinking that in no single instance, from the time when we first entered into communication with you, has any misunderstanding arisen to interrupt the general harmony that has prevailed throughout the exhibition.

While we feel that we are much indebted for this happy result to the cordial co-operation of yourself and your colleagues, we are also sensible that no small share of thanks is due to the executive and officers of your commission, to whom we would therefore request you to tender our warmest acknowledgments.

We have also to request that you will have the goodness to communicate the substance of this letter to the various members of your commission and to your Government; and begging you to accept personally our very high esteem,

I am, my dear sir,
Yours, very faithfully,
GRANVILLE.

What an English Ironmaster thinks of Us.

MESSRS. EDITORS:—Before leaving this attractive and fine city, I feel desirous of writing something about the iron manufacture and other matters.

It is a mistake made by many Englishmen to suppose that the recent American tariff was intended as a "slap" at England. It is plain that the impending civil war, at the time of the passage of the Morrill tariff, convinced the public men of this country, that measures must be taken to increase the revenue, to protect home manufactures, and thus to promote home supplies; for no man could tell when a state of war would intervene to cut off the supplies of cloth and iron from Europe. Those duties, made protective by their amount, will in all probability be lasting; at least, during the coming generation: so it strikes me it would be the part of wisdom for English and continental manufacturers, who have fabricated for the American market, to transfer themselves and their capital to this country. Here, in this lake region, is to be found a fine climate, labor in abundance, and raw materials, which would place a Staffordshire or Welsh manufacturer of rails or other iron fabrics in a better position than at home; that is, if he looked toward the American market for sales. In fact, he could make iron for foreign markets, if he had adequate capital, in this very city. The same would be true of other branches of trade—woolens, linens, leather, &c.

I find this to be a very great leather-making district; little of very good quality is made, but there are facilities for every quality; skill and capital only are wanting. Iron ship-building is a branch of business for which few localities possess greater facilities than Buffalo. I was shown an iron screw steamer which I was told was entirely constructed here—iron for the hull, engine and all; she is large and would appear to advantage in the port of London.

From the spirit manifested by all classes of the people—all over the regions which I have traversed (and I have visited all the States south of the Ohio river)—I feel sure that the Union will *not* be broken into two or more fragments; the Northern and Western people have the power to put down the rebellion, and they will do it. It may be doubted, but I give it as my opinion that those people have scarcely began to draw upon their resources; they are as it were untouched. Men abound everywhere; and there is every appearance of wealth and abundance. Regiments of men go to the war, I am told, and one-half of them fall in battle or die of malarious diseases thousands of miles away from home, then others cheerfully come forward when more regiments are called for. As yet no conscription has been resorted to, but that is in every way the fairest and most proper way in my opinion to raise troops for the State; when it is, then it will be easy to send into the field hundreds of thousands of the very best of soldiers. So, if the war continues for years, there will be no want of soldiers. The highest rank in the army of the United States is open to the privates, which opportunity gives a charm to the warriors' life; he dreams of the general's baton. Americans are a warlike people; I think this, now that I have mingled with them. In my opinion, on the 1st of January, when the President's proclamation goes into effect, a change will come over the war. I hope to see peace in this great land once more.

A STAFFORDSHIRE IRONMASTER.

Buffalo, N. Y., Nov. 27, 1862.

Mending Water Pipes.

MESSRS. EDITORS:—Many of your readers have doubtless had more or less trouble at some period of their lives in repairing water pipes, where the water could not be shut off, conveniently, at the fountain head or some intermediate point. In going to my office a few days since, my way led past a place where a man was repairing a lead pipe which had been cut off, accidentally, in making an excavation. There was a pressure of water of more than fifty feet head. His plan seemed to me to be novel and ingenious. The two ends of the pipe were plugged and then a small pile of broken ice and salt was placed around them; in five minutes the water in the pipe was frozen, the plugs removed, a short piece of pipe inserted and perfectly soldered, and in five minutes more the ice in the pipe was thawed and the water flowing freely through it. It seemed to me that so simple a method of doing a somewhat difficult piece of work should be more generally known, and I know of no way of reaching the mechanics of the country so readily as through the columns of the SCIENTIFIC AMERICAN. A. D. B.

Springfield, Mass., Nov. 28, 1862.

Petrifying Wood.

MESSRS. EDITORS:—In the late exhibition in London there was exhibited a specimen of the adaptation of various-colored woods for imitating mosaic work in geometrical patterns. The idea was suggestive, and it occurred to me that if these bits of wood could be hardened into something like stone, one great point would be obtained. In one or two back numbers of your truly invaluable paper there have been notices of experiments in the manufacture of artificial stone without heat. In the number for November 29th there is a method described that seems to me almost satisfactory. Could not this or a similar process be adopted to fill up the pores of wood so as to render it as hard as stone? ALBERT KHRAUFTS.

Castle Craig, Va., Nov. 26, 1862.

[Wood can be rendered hard like stone by the mode suggested by our correspondent, but then the effect of the different colors of various kinds of wood inlaid in separate pieces will be lost. By steeping wood in water containing carbonate of lime and silica in solution, it becomes petrified.—EDS.

Postage-stamp Eraser.

MESSRS. EDITORS:—I see by remarks in several papers that the practice of collecting old postage-stamps, cleansing them and using or selling them for use a second time, is getting to be a regular business, as well as a great nuisance. Why is it that no better plan is adopted by Government to prevent this practice than the uncertain penalties of the law? As we are entering upon an era of stamps it seems highly important that stamps should be canceled in a more effectual way than by doing it with ink; that plan is behind the age. What banker would pass a canceled note over his counter, that had nothing except ink upon it to show that it had been canceled? Some person with sufficient time and enterprise to introduce such a patented article would make a fortune with it. S. W.

West Melton, N. Y., Nov. 25, 1862.

[This is certainly a subject of great importance to the Government, and we wonder that the Post Office Department does not adopt a better system to in-

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sure the canceling of postage-stamps. Thousands of stamps are cleaned and used a second time; therefore some cutting tool or other device must be adopted, which would greatly lessen the fraud. The Post Office uses a very common stamping ink for the cancel-marking of postage-stamps; this poor ink can be easily removed without much injury to the paper or to the figure of the stamp. The cancellation, however, might be effected by the use of a chemical ink, which could not be removed without destroying the whole face of the stamp.—EDS.

On Shoeing Horses.

MESSRS. EDITORS:—Seeing an extract from a letter by G. H. Dadd, veterinary surgeon, on shoeing horses, on page 336, present volume of the SCIENTIFIC AMERICAN, and having different views on some points from Mr. Dadd, I desire to communicate my views through the columns of the SCIENTIFIC AMERICAN, asking to be corrected by some practical person if I am wrong.

The first question is, what is the object of applying a shoe to the foot? It seems reasonable to suppose that it is to improve the foot by making it more durable, less liable to become sore in traveling, to take a more sure hold on anything upon which it may be placed in drawing heavy loads, or in moving swiftly along the muddy road and the paved street, and to secure, as far as possible, the natural action of the foot.

The next (and the one about which practical men differ so much) is how to accomplish the object in the best manner. My objection to Mr. Dadd's mode of constructing a shoe, is that the cupping of the shoe on the ground surface, as proposed, will have to be carried to such an extent that it will be difficult and quite expensive to manufacture the shoe, because the shoe must be cupped on the inside or hoof surface, and be of sufficient heft to resist any force the animal may bring to bear upon it without breaking or bending. Such a shoe, unless provided with calks or projections to pierce the ground, will be as liable to slip or nearly so, as the unshod foot. Some hold it to be more liable, because of less friction between iron and wet muddy or icy roads, than between the hoof and the same.

The cause of the greatest number of slips or falls of horses is the absence of anything to pierce the hard icy or wet muddy roads to a sufficient depth to obtain a firm hold. If Mr. Dadd's shoe was provided with what is commonly termed calks, it would destroy his theory. The method which I practice is to pare the foot, so that if it was set upon a perfectly level surface, the shell or horn portion would fit to it all around, taking care to make the foot dishing, if the form of the sole will admit of it, cutting as little from the heel as possible, and as much from the toe as will answer, which makes the foot take a more upright and natural position. Then I make the shoe just the shape of the shell of the foot, except near the heel, where I allow the shoe to become a little wider than the foot, and project a little back (say half an inch) of where the foot rests on the shoe. The ground surface I make level, except that the heel is turned down at a right angle with the face of the shoe, forming calks about half or three-fourths of an inch in length, and a broad one welded to the toe, equidistant from each heel calk. The shoe is made concave on the upper side, back as far as where the shell begins to incline inward, where it should begin to become circumflex. The nails should all be placed forward of where the foot begins to incline inward. The shoe and the foot should fit perfectly together, and the shoe should rest only upon the shell of the foot, into which the nails should be driven. If the foot has been deformed, variations of the shoe must be made to suit the circumstances of the case. The above is the outline of my method.

NORRIS T. PHELPS.

Williamsfield, Ohio, Dec. 1, 1862.

Distilling Benzine.

MESSRS. EDITORS:—Some time ago, while experimenting on the manufacture of aniline dyes, in distilling the benzine I was much troubled by the vapor condensing back into the glass still on touching the sides as it ascended. Naturally supposing this to be caused by the difference of temperature between the inside and outside of the still, I had recourse to the usual way of covering the still with rags, this remedied the trouble to but a certain extent, and was found quite inconvenient on the account of the rags being exposed to get on fire from the flame of the lamp. The idea then occurred to me to cover the still with plaster, mixed with water, of a sufficient consistency to adhere to the sides of the still, and before allowing it to dry thoroughly I cut the plaster jacket in half, removed the lower part of it, in order to leave the still exposed to the heat of the lamp. I then cut a small round hole in a convenient place to enable me to watch the thermometer; by this means my still was entirely protected from the cold outside air; the two halves of the jacket being held together by a piece of wire tied around them. This I think is a simple and cheap way of avoiding back condensation.

In regard to the increased price of your paper hereafter, I fully endorse the views of S. L. Denney (whose letter was published on page 342 of the present volume of the SCIENTIFIC AMERICAN), and I would add that, for the last ten years, although I have had many "ups and downs," I never stopped but once taking the SCIENTIFIC AMERICAN and I have regretted it ever since. I consider it the best and cheapest publication of the kind in the world, and hope you may not lose any subscribers on account of the advance asked. C. COLNE.

Washington, D. C., Nov. 28, 1862.

New Plan for Propelling Steamships.

MESSRS. EDITORS:—A great loss of power is occasioned in steamships by the unequal immersion of their paddle wheels in the water. This is owing to a vessel being sometimes loaded quite light while at other times she is freighted heavily, and it is also due to rough seas, the waves of which sometimes almost cover the wheel. The labor of the paddle wheel when nearly submerged and the great strain which then comes upon the shaft necessitates engines and shafting of greater size and strength than would otherwise be required, if the evil of unequal labor of the paddle wheel was overcome. I take this medium to present a plan for overcoming the difficulties mentioned connected with paddle-wheel steamers.

I propose to construct in the bottom of a vessel, one or more recesses, of sufficient strength to resist the necessary pressure, and to have the top and sides air-tight, leaving the bottom open; these recesses are to be placed in the most convenient parts of the bottom or stern of the vessel, for strength, as well as to obtain the proper and easy approach and departure of the water. Within these recesses I propose to place paddle wheels with their shafts passing through one or both sides of the case which surrounds the recess, which is to be made tight by stuffing boxes to prevent any leakage of air. These paddle wheels are to be driven by ordinary steam machinery. The dip or immersion of the wheels will be only enough to obtain the greatest effect, as the compressed air in the case will prevent the water from rising above a certain level. Any loss of air, either by leakage or by being driven out under the vessel mixed with the water by the action of the wheel, can easily be replaced by means of an air-pump, worked by the engine. The approach of the water to the paddle wheel should be made easy, also the departure of the water from the wheel, and sufficient room should be allowed for the lifted water to pass from the buckets, also for any air that may be mixed with the water to return to the recess.

It is probable that the wheels may be made much smaller on this plan as the engine may be made to work with greater speed by not being so ponderous in its parts.

There are objections to this plan arising from of a somewhat different construction of parts of the hull required by the recesses. These recesses would also take up some room, but they would not injure the buoyancy owing to the compressed air contained in them. There would be an increased resistance to the floats by the compressed air in the recess, but this would not cause much loss of power as there should be plenty of room for the air to move around with the floats.

The top of each recess should have a man-hole in it, and covering this an air-tight case of sufficient size for one or two men to be enclosed therein after passing through a door which might be closed air-tight, when by opening a cock connecting with the recess, the air may be equalized. The man-hole plate could be removed, and access to all parts of the wheel could be had to make repairs, and, if needed, those floats which would be immersed, when the wheel was at a certain point, could either be removed or slipped up the arms, so as not to impede the speed of the vessel if she should be under sail.

The lowest part of the wheel should be one or two feet above the bottom of the keel, and if a vessel was built for the purpose, nearly all, if not all the dip of the wheel could be below the bottom of the vessel and yet be above the bottom of the keel. The above plan would seem to be also particularly desirable for steam canal-boats; on account of their variable draught of water.

WILLIAM H. WOOD.

Hudson City, N. J., November 26, 1862.

What our Old Subscribers say.

MESSRS. EDITORS:—I have just received your last number of the SCIENTIFIC AMERICAN and have read with some interest what you state in regard to the cost of publishing the paper. I think your friends (and you have a host of them) will say: "Increase the price rather than diminish the size of the paper." You may consider me a life-subscriber whatever the price you may be compelled to ask. I have now fifteen volumes, which I would not part with for any money if I could not replace them. You have my best wishes for your continued success in publishing the best paper of its kind in the world.

Yours, for the Union and the right,

J. H. GIBSON.

China, N. Y., Nov. 26, 1862.

[The above expresses the sentiment of all who have written to this office relative to the increase in the price of the SCIENTIFIC AMERICAN. We were in doubt at first whether to diminish the size of the journal or increase its price, so to conform to the present high price of printing material. We are now satisfied we "hit the nail on the head," in adopting the latter course, and we are gratified at its receiving such a hearty response from so many of our subscribers. A friend and subscriber—a native of Georgia, but now residing in Louisville, Ky.—writes us a long letter full of complimentary remarks in reference to the SCIENTIFIC AMERICAN and the recent increase in its price, which has been necessitated by the unparalleled advance in the cost of printing paper. We fully appreciate the value of his attention, but hope that our modesty will be deemed sufficient excuse for not publishing his letter in detail. This Southern subscriber pays a glowing tribute to the energies and talents of our inventors, and ends by loyally hoping that the day may not be far off when the whole brotherhood—North and South—shall be again in communication with each other. In this wish we beg to concur most heartily.—EDS.

The Inventive Genius of California.

We notice, with much satisfaction, an increasing development of inventive genius in the Golden State. A great number of patents have been solicited for residents of California through this office, during the past year, some of which have proved very remunerative to the inventors. We wish the writer of the following letter the same good fortune which has fallen to the lot of others in his State, whose business was conducted through the Scientific American Patent Agency:—

MESSRS. MUNN & Co.:—Your favor of Sept. 3d has come to hand, covering the official notice that the patent for my machine has been allowed. Receive my thanks for the very satisfactory manner in which you have conducted my business. Your house has been long familiar to me as being the most competent and thoroughly honest firm of patent solicitors in the United States, and your dealings with me have proved that my opinions were well founded. The able manner in which you draw up specifications for inventors can only be done by persons having as many years of experience as you have had in that line; likewise the impartiality you show to inventors, in giving to the humblest mechanic as much attention as you would give to the richest "nabob," renders the agency of MUNN & Co. the very best for an obscure inventor to transact his business with. If what little influence I possess is of any avail, I shall recommend your services as patent solicitors, and also your valuable journal, the SCIENTIFIC AMERICAN, to all my friends. F. R. WILSON.

Auburn, Cal., Oct. 21, 1862.

LATE English mails announce that no less than seven new steamships are to be placed on the line between Havre and New York; five of them are to have engines of 1,000-horse power each.

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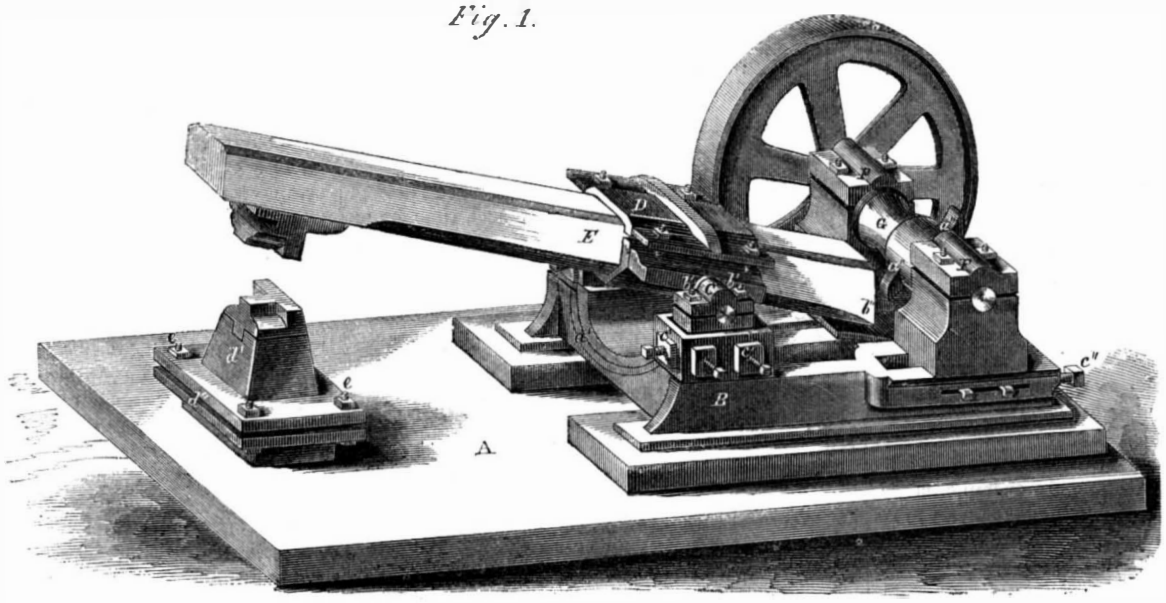
Improved Trip Hammer.

In the operations of the blacksmith shops, where large forgings are made, it is found necessary to use heavy hammers in order to expedite the work. There are many varieties of these tools, such as steam, trip, and tilt hammers. The one we herewith illustrate is a trip hammer, and has some favorable features in its construction which we shall proceed to notice. The large plate or bed, A, has another bed piece, B, affixed to it; upon the forward part of this are the blocks, C, which carry the hammer proper through the plates, D, bolted on to the hammer shaft, E. At the other end of this bed plate are the pillow blocks, F, in which the tripping shaft, G, runs; the usual fly-wheel is keyed on to the outer end. By examining the engraving there will be seen two curved or semi-circular lines, a', upon the front end of the bed plate, B; this is the peculiar feature of the invention, and permits of the lateral oscillation of the hammer to a limited degree. By slacking off the bolts, b', and screwing up similar ones in the other pillow blocks upon the opposite side, the relative situations of the anvil and the hammer are altered.—Provision is also made for adjustment of the main pillow blocks, in which the hammer vibrates, by the set screws, c'; also, for effecting the same object longitudinally in the blocks, F, are the set screws, c''. The toes for working the hammer on the shaft, G, and the trip toe on the hammer, are marked respectively a'' and b''. The anvil block, d', has a concave base which fits over a convex casting, d''. The anvil can, by slacking off the bolts, e, be set at any required point.

Fig. 1.



KINSLEY'S TRIP HAMMER.

Fig. 2

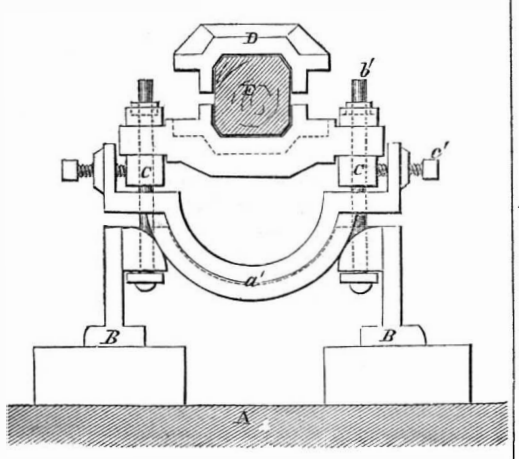


Fig. 2 is a section of the hammer through the blocks, C, and plate, D; showing clearly the arrangement and attachment of the same to the hammer and bed plate, B. The curved seats are also clearly shown, as well as the connection of the bolt, b', with the underside of the frame. It will therefore be seen by the arrangement of the curved bed pieces, both in the hammer and the anvil, that the respective faces of them can be set at any angle, and that taper or wedge-like forgings, or the same thick on one side and thin on the other, can be manufactured without calling in the aid of special dies for the purpose, as is sometimes the case.

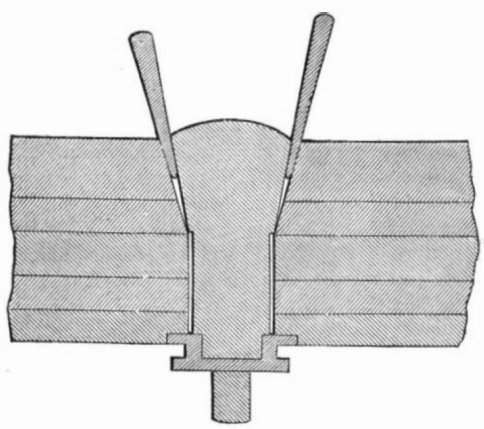
An application for a patent on this invention has been made by Mr. Lyman Kinsley, Jr., of Cambridge Port, Mass., and further information in reference to prices, &c., can be had of him.

OUR SHIP-YARDS.

The large ship-yards upon the East river (New York) are busily engaged in fulfilling their contracts. Mr. William H. Webb has four large steamers on the stocks in an advanced stage of construction. These are the two Italian frigates, one large side-wheel steamship for the Pacific Mail Steamship Company, and the immense iron-clad ram *Dictator;* the frame of this latter vessel is well under way. At the yard near the foot of Houston street, there are also two large steamships building for the merchant service. Operations are prosecuted upon these ships with much energy, and from the appearance of them, one or two will soon be ready for launching. The Messrs. Van Deusen Brothers, have also six steamers of about 1,000 tuns burthen, in various stages of completion, one or two of them having been launched.

NEW METHOD OF DRAWING TAPER BOLTS.

A short time since the vault of a New York bank became inaccessible through an accident to the lock. It was apparent that only two methods could be adopted to get at the deposits; these were to break up the lock through the hole in the door so that the bolt could be shot back, or else cut through the door, which was made of alternate steel and iron plates amounting to twelve inches in thickness, and then destroy the lock through this hole. Upon reflection it was decided to try both plans, and the preliminary steps were taken to put one of them in execution when a workman suggested that it would be well to drive two steel wedges in around the head of the bolt. This was no sooner done than it parted at the shoulder and flew out with great violence. Mr. W. H. Butler explained this plan at the Polytechnic Institute on Nov. 18, 1862, with an illustration, which we publish herewith.



A GENTLEMAN in an inland town tendered a dollar bill to pay a charge of sixty cents, and was gravely offered forty squash seeds to represent the balance due him.

THE PITCH OF MACHINE SCREWS.

It is astonishing to us that no general system of making taps has been adopted by the machinists of our country. The proper pitch for the different threads has been ascertained by the best makers, and they are very nearly similar in their proportions. Six to the inch makes a good, strong, and serviceable thread for an inch-and-a-quarter bolt, and from four to five threads for an inch-and-a-half or an inch-and-five-eighths screw. Eight or nine threads to the inch make a good standard for seven-eighths and inch bolts; eleven and sixteen threads answer well on five-eighths and three-eighths screws. These are the sizes or pitches most commonly used, but there is, as we have stated, no fixed standard and these numbers should be changed from odd to even ones. It is inconceivable how any person in full possession of all his faculties can set deliberately to work and make a tap with fractional parts of thread; unless, indeed, it be wanted for some special purpose. We have often met with screws and bolts that were divided into $11\frac{3}{4}$ or $5\frac{1}{2}$ spaces to the inch, in fact all the variation of the calendar numbers. Now most mechanics will at once see what confusion this leads to. Supposing one manufacturer to make a printing press and send it out into the country; some important bolt breaks just as half the edition has been run off; the proprietor then sends for the country blacksmith to come and repair it. This person brings along his time-honored stocks and dies, cuts a bolt, and proceeds to screw it in; it enters easily enough, but goes hard when nearly home, The blacksmith, taking this to be an evidence of his good workmanship, twists away and finally strips the thread out of the press casting. All this comes of having fractional parts of threads upon screws. What was at first a simple matter, becomes a complicated one, and involves a special journey from the workshop, the insertion of a larger bolt and confusion generally. We have said enough upon this point, but there are other instances and examples that we might quote out of our experience, which would go to strengthen our argument, that there should be a standard or fixed table adopted by the principal manufacturers in the country for screw bolts. There is no reason why a person in want of such a thing should not go to a hardware store and buy ten or twenty bolts of any size. He cannot do this now, because he does not know, unless he have a technical knowledge of the subject, whether they will suit his machinery.

Gas-fitters have a standard; and any gas pipe in the United States will fit an elbow, a joint, or a thimble made by persons thousands of miles apart. We repeat, that for the regular sizes of bolts in daily use, from half an inch up to two inches, some plan previously agreed upon should be adopted. Let the fiat go forth among all screw bolt makers, that the threads must be such, and so many to the inch, and we should speedily see a great reform inaugurated in this (to the mercantile community) important matter.

DRINK LESS WITH YOUR MEALS.—Many men have relieved themselves of dyspepsia by not drinking anything, not even water, during their meals. No animal, except man, ever drinks in connection with its food. Man ought not to. Try this, dyspeptics; and you will not wash down mechanically that which ought to be masticated and ensalivated before it is swallowed.

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VOL. VII. NO. 24.....[NEW SERIES.]....*Eighteenth Year.*

NEW YORK, SATURDAY, DECEMBER 13, 1862.

PROGRESS OF THE MECHANIC ARTS.

Nothing is more striking to the observer who goes the round of our machine-shops at the present day than the advantages manufacturers now have in new and original tools in connection with systems for accomplishing specified results. It is, as it were, a new era, and those establishments which cling fondly and blindly to the old-time traditions, which were in vogue twenty or even ten years since, are apt to find their dividends slipping away unconsciously, and their profits vanishing in a vexatious and perplexing manner.

Let us indulge in a brief retrospection and investigate the condition of apprentices, for example, fifteen years ago. At that time it was thought a very great favor, in some establishments, to take a young man to learn the machinist's trade and allow him to pass the first years of his novitiate in carefully sweeping the floors, bringing water for the men, holding lamps for certain celebrated workmen ; and he who should attain to the honor of fetching the foreman's rule or his chalk, or of cutting bolts in a vise with a pair of stocks and dies, was thought to be on the high road to distinction. Happily, these abuses are abolished. It never occurred to the worthy employers that they were not only imposing upon the confidence of those persons whose sons were committed to their care, but that they were also throwing away money, by allowing active and intelligent youths, who were desirous of distinguishing themselves, to fritter away their energy in menial occupations.

The national shrewdness has been the great leaven of reform in this particular. The systems in vogue now are to forward young men as fast as possible ; and if they have any special fitness for their professions, to find it out as quickly as may be and turn it to account. The lathe has supplanted the broom, the stocks and dies have been deposed by machinery for the purpose, and the consequence is, the production of a higher and more intelligent class of workmen. Witness, in proof of this latter assertion, the new machines ; examine the order and method in regulating workshops as compared with the ruinous slovenliness once practiced.

From the new men, as we may call them, come all the improvements. They have seen the requirements of the work and have executed them. They have discovered that iron might do the work of muscle, and have applied it to that duty ; and the results have been apparent not only in a pecuniary point of view, but also in a social view, the boundaries of which no man can set. Take, for instance, the sewing machine—without the mechanical system instituted it would be impossible to make them except at such a cost as would forever debar their general use ; or the rifle—what could the North have done when disarmed, without those wondrous private armories which reproduced, as if by a stroke of magic, the thousands upon thousands of weapons which were indispensable to the prosecution of war? Simply, nothing. What other arguments are necessary to demonstrate the value of the new regime?

Once, when a cylinder of a steam engine required to be re-bored there were many and profound cogitations. The factory was stopped, hands were thrown out of employment for days, even weeks, according to the size of the cylinder, and much tackling, and large orces of men were brought into requisition to take the machinery apart and truck it to the workshop. Now, three men bring a light machine on a cart, fasten it to the cylinder flange and bed-plate, and do in a few hours what formerly required days to accomplish.

We might go on and multiply instances without number which would demonstrate beyond peradventure, how much better the new days and systems are than the old—how far superior, in every way, they are to those crude and awkward attempts which characterized the early history of the mechanic arts in every country. Where the limit to their progression will be fixed is something impossible to predict. As new obstacles arise they will be surmounted ; as fast as mechanical riddles are proposed they will be solved, until all the menial offices and drudgery of life will be performed by the mutes who now slumber in the earth. They await only the fashioning hand and vital genius of the mechanic and inventor to fall to work.

READ!

Read continually, only reserving such time for relaxation, and the duties of life as your situation may require. Don't sit with your hands folded and mouth open, doing nothing ; these are minutes which you are wasting—minutes make hours, hours make days and weeks, and all combined are swiftly flying toward eternity. Then read!—read everything and anything, except low and trashy subjects ; there is no branch of art or science or of literature from which, properly perused, you may not get some valuable information. The difference between the reader and the sluggard, who sits in the rocking chair asleep of an evening, is as great as the contrast between a fool and a sensible person ; the former goes about the world, sees, hears, thinks and digests the results of his observation during his travels ; he will presently give these reflections to the world in a new and interesting shape and thus make other readers. But the sluggard is a useless character and not worth the ink to describe him. Read an almanac if you cannot get a paper ; and he must be poor indeed, as the bard singeth, who cannot afford a subscription to some journal in this age of the world. At all events leave no means untried to cultivate and improve the spare hours which you will have during the winter months. If you smoke, read!—if you are waiting somewhere on business, take out your paper and peruse its columns ; you will soon find the advantages of the practice. We have a great reputation as a reading nation ; a paragraph went the rounds of the press some time ago, which was intended for a joke, but it was in reality a compliment ; it said that if a traveler abroad went into a room where there were a number of Americans, he would be sure to see two-thirds of them reading newspapers. So he will. Go into the theatre, or the concert room, and you will find a large portion of the audience beguiling the tedious half-hour previous to the commencement of the festivities, with a magazine or paper. This is to their moral advancement and benefit, always supposing the mental food to be of a wholesome nature ; and the future of any people who are readers and thinkers is just as certain to be glorious as it is an established fact that water finds its level. Intellects find their level ; they find them in one way or another—in the newspaper, through the magazine, or in the heavier essays which require patient toil and thought to eliminate and elaborate. Then read ! continue to peruse every scrap of information within your reach ; there is *gold* everywhere. California has not the only gold mines in the country ; there are solid nuggets laid up on the shelves of the Astor Library which all the wealth of the Indies is powerless, through itself, to produce ; there are stores of information of every kind under the sun within your reach, that cannot perish. Time shall overwhelm all things and render mines useless, gems of no value. The thief may in an hour destroy the labor of a lifetime in accumulating a fortune, but no power, short of a divine one, can wrest the riches of a well-stored mind from its possessor. Again we say—read!

WE have no report of the meeting of the Polytechnic Association this week ; the occurrence of Thanksgiving on Nov. 27th having prevented the meeting.

COMPRESSED AIR POWER.

A correspondent states he has been informed that a Mr. Jowitt, in Birmingham, England, has proposed to concentrate all the steam power in that great manufacturing town, and employ it in compressing air, which is to be conveyed in pipes to drive machinery in the different workshops. He also states, that a company has been organized in Liverpool for employing compressed air, in this manner, for hoisting purposes, and that it is to be used in no less than three hundred warehouses. The general plan is to convey compressed air as the motive power for driving machinery in cities, in the same manner that gas is supplied for general illuminating purposes, instead of being made in small retorts at each public building, manufactory, &c. Our correspondent also wishes to know, if this system possesses economical advantages over the common modes of using steam engines.

It is only by fair experiments that the comparative economy of such a system can be determined. We have no very reliable data to guide us in arriving at a satisfactory conclusion. For warehouses which are stored with combustible materials, compressed air as a motive agent, conveyed in the manner described, would be very safe as it regards the danger from fires. The project of Mr. Jowitt, however, is anything but novel. It was discussed by us very fully on page 289, Vol. I (new series) of the SCIENTIFIC AMERICAN. Compressed air was tried on a small scale by Mr. Bishop, of Carrolton avenue, Brooklyn, in driving sewing machines, in a small factory, but it did not give satisfaction. He now employs steam, and conveys it in a pipe to operate a small engine, having a cylinder of three by two inches connected to each sewing machine. This arrangement obviates the employment of a single large engine, also shafting and belting. The piston-rod of the small engine is connected direct to the crank pin on the wheel of the sewing machine, and by simply turning a faucet, like that of a gas jet, the engine is set in operation or stopped by the attendant girl.

Judging from the past experience of such an engineer as Brunel, in his application of compressed air upon a gigantic scale for railways, instead of employing locomotives, we would conclude that it is far more expensive and troublesome than to use steam power in separate establishments. Unless the tubes in which compressed air is conveyed long distances are as smooth as glass, they absorb an immense amount of power by the friction which they cause. Such a system, however, of conveying motive power in cities, is very desirable, because it is cleanly, convenient and safe. If positively practical on a large scale, it would obviate the use of the numerous steam boilers and engines placed under our pavements and in the cellars of buildings, for driving printing presses and other machinery, as power could be drawn off in the same manner as we draw supplies of water and gas.

THE "PASSAIC" ON TRIAL.

The iron-clad steamer *Passaic* has at length reached her destination at Fortress Monroe. Owing to a slight accident which happened to her boiler, she was obliged to have assistance to get up to the anchorage. The buoyancy of the vessel is said to have been very good. The *Passaic* experienced only a few hours of rough weather, but during that time she is reported to have behaved well. Owing to the impossibility of making the usual arrangements to prevent water coming in at the junction of the turret with the deck, it was thought that much inconvenience would be felt from this cause. It was found, however, that the plan adopted by Mr. Ericsson to guard against this worked properly. The ship answered her helm satisfactorily, but the present steering wheel will be removed to make room for a larger one. The deviation of the compass was about one quarter of a point.

We trust that the *Passaic* may fulfill all the conditions sought for in her construction, but we feel a degree of uncertainty in regard to her future.

STRONG brown paper is now manufactured at the Salisbury Paper Mills, in Orange county, from "cat tails," the product of the wild flag growing in low grounds all over the North.

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THE INNOVATIONS OF THE AGE.

There is food for sober reflection and much interesting research in the facts that come under the daily attention of journalists. Were we to devote our energies to the elucidation of all the natural and social mysteries that arise, the seven tasks of Hercules would be but holiday sport in comparison to the thousand and one avenues of thought that branch out in every directien. Once, the universal consumption of whale oil was thought to be the vital interest of certain classes. On a little island, some sixty miles from the Massachusetts coast, there reside a hardy race of men and a wealthy community of merchants, who employed all their energies and capital, at one time, in the prosecution of the whale fishery. Massachusetts alone embarked more interest in the fisheries than all the other States combined; and one town on her borders--New Bedford—has long been celebrated in local history as the home of the whaler and place of deposit of the oleaginous product of the great cetacean family. The visitor may go there, today, and see in the suburbs of the city the gardens and houses decorated with the spoils of the sea—the jaw-bones of the whale forming an arch through which the guest walks to partake of the hospitality for which its people are famous. But alas! how has their glory fallen! The ships that went down to the sea with colors set, and guns booming their rude adieux from the beach—the brave crews swinging up into the rigging to give their parting cheers—these ships, if they be not wrecked in some tropic sea, lie rotting at the wharves, dismasted, dismantled, as silent as the grave. The seas shock them to the keel no more. The pitchy smoke from the try-pots, the glare and turmoil of "cutting-in" and of "trying-out," nay even the crash in full career of the vessel upon the whale's back, as has been the case, are stories and legends of the past. It is a theme for the poet, not the journalist; so rich and full are the histories and facts that cling about this once great artery of national wealth. But as we have said, the times are changed. Under the heading of "The Last Ship"—a title which has a touching pathos in it—the Nantucket *Mirror* says:—"The ship *Narragansett* left this place on Saturday evening last in tow of the steamer *Island Home*. She has been purchased by a firm in Boston and taken to Fair Haven (opposite New Bedford) for repairs. Not a ship now remains at our wharves. Little did we think, twenty-five years ago, that we should ever be called upon to chronicle this fact. At that time our wharves were crowded with shipping and noisy with the din of hammers and drivers, caulking mallets and axes; teamsters were trucking oil from the wharves to the various factories about town, and unloading stores for the shipping; vessels were constantly arriving and departing, and the cheerful song of the mariners was heard as they unloaded their cargoes at the wharves. Where all was then bustle and confusion is now silence and quiet. A few short years have brought about this change."

What a picture is this of a once thriving and prosperous mart! We venture to assert that the counterpart of it can nowhere be found, outside of the war-ridden districts, in the country. The deserted village of Goldsmith's poem, the stagnation of Sleepy Hollow related by Irving; these only compare with the change wrought by the introduction of gas and the gradual increase in the natural and artificial production of coal oils. Even Nantucket is now lit with gas; and it is related by a writer in a late periodical, that so great was the opposition manifested by the oil merchants of New Bedford to the introduction of gas-burners, that they offered to light a Western city with sperm at something less than a dollar per gallon, when the market price of the same was a dollar and a quarter. These are nature's compensations. It has been intimated in our hearing, by old whaling masters, that the fishing grounds had become, not indeed exhausted, but that the whales were fewer, shyer and more difficult to take; that of late years they had withdrawn much further into those inaccessible fastnesses of ice and snow that lock the North Pole in impenetrable bonds and keep untold the secrets of the North-west Passage. If this be true, then, with the momentary extinction of the whale fishery, perhaps renewed assurance of life and the pursuit of happiness may so modify the fears of the timid whales that they will repeople their old haunts, so that the pursuit of them will be more profitable than has lately been the case. To balance this we have rumors that the oil wells have begun to fail in their yield; that those which gave abundantly in the Middle States show signs of exhaustion; and that the West of Canada is now the promised land for this important article of commerce.

We cannot say, from a lack of positive evidence, whether these rumors have any foundation or not. But it seems plausible enough, if the latest theory we have seen broached as to the source from whence the oil is derived be reliable, that the supply should be on the wane. This theory was that petroleum is the product of a vast number of animalcules, buried in the earth during the Devonian period, and whose masses yielded by pressure the oil in question.

A contemplation of the inroads and incursions of time upon the customs and commerce of the country presents many interesting features. Wood, once so plentiful that it was formerly used entirely for fuel and was sold for two and three dollars a cord, has been wholly supplanted, in cities, by coal. The ax of the settler has leveled the forests that fringed the margin of the towns, and the cost of transporting wood has become so great that it cannot compete with coal; add to this the inconvenience of storing it in cities, where the room for such purposes is limited, and we have the secret of its unpopularity. Cost combined with its great bulk has so diminished its consumption that wood is only used for igniting the coal. These changes, however, were not accomplished without much time and pecuniary outlay. When anthracite was first discovered outcropping from the land in Pennsylvania, a great many experiments were tried before it became useful as a calorific agent. An old Quaker is said to have been the first one who originated the plan of burning it in open grates; but long before he tried it, the Danes and Saxons used this mineral in a limited degree for fuel. Those persons who fondly fancy that their flickering sea-coal fires are an invention of modern times may perhaps be surprised to learn that, as long ago as 1306, the use of it was prohibited in London under the supposition that it was dangerous to health. This certainly is not an innovation of the age.

Thus, one by one, the usages of the world change, as the articles which are necessary to the support or adornment of life become exhausted or are displaced by others more suitable for the purpose. Science is continually discovering, in the refuse and waste of manufactures of all kinds, dyes, manures, chemicals, in fact the multifarious compounds which are indispensable in the workshops or laboratories. Change and research are the order of the day. As one method becomes worn out, it is dethroned and another substituted. If oil fails to give sufficient light in this lightning age, lo! camphene comes with all its different combinations to supplant it. These in their turn are banished on account of their dangerous qualities, and oil modified in its nature and character is resumed. But gas remains paramount, so far, as an illuminator; what will succeed *it* is a question that remains to be settled by future developments and exigencies. The whale fishery dies out, but coal oil is pumped or distilled from the bowels of the earth. Wood is too scarce and costly to burn; and coal is substituted. Rags vanish from the paper mills, and the presses of the country move languidly for want of vehicles to transmit their intelligence to the people. What shall supplant the rags?—who will discover a substitute for them as paper stock?

Curious Railway Statistics.—It is estimated that the railways in England, Ireland and Scotland annually carry six times in number the population of Great Britain. It is an average day's work of its railways to carry 500,000 passengers, 258,000 tuns of minerals and merchandise, 35,000 cattle, 1,100 dogs and 740 horses. The trains—passengers and goods trains added together—travelled 2,897,748 miles more in 1861 than in 1860, which is equivalent to going around the world 116 times more last year than in the year before. 8,881,990 trains ran in the course of the year. The length of the lines open is 10,869 miles; and the gross receipts of the year, £28,565,355, considerably exceeded the interest of the national debt, and amounted to about 8 per cent on the capital. About one passenger in every 300,000 carried annually is injured.

VALUABLE RECEIPTS.

Oxygen Gas.—Oxygen is one of the elementary substances and it occurs in greater abundance than any other element. It is estimated that one-third of the weight of the whole earth is oxygen. Almost every fluid and solid found in nature contains oxygen. Water contains eight-ninths of its weight of it, and it constitutes one-fifth of the bulk of the atmosphere. In sand it forms half of its weight, and clay and limestone contain about the same amount. Oxygen is a colorless, tasteless and inodorous gas, and is distinguished from other gases by supporting combustion with great vigor. A cubic inch of it at 60° Fah., when the pressure of the atmosphere sustains a column of 30 inches of mercury in the barometer, weighs 0.3418, or nearly one-third of a grain.

Preparation of Oxygen Gas.—For experimental purposes this gas is conveniently made from equal parts, by weight, of chlorate of potash and black oxide of copper well dried, finely comminuted and mixed together. When placed in a glass vessel and exposed to a gentle heat over a spirit lamp, it becomes red hot and disengages a current of pure oxygen. The best vessel to use for the experiment is a hard glass tube about one inch wide and six inches long. It is stoppered with a long sound cork in the center of which is inserted a small bent gas-tube twenty inches long and of half an inch bore. The disengagement of the gas ceases suddenly, and a dry coarse black powder is left behind. It consists of the black oxide of copper and chloride of potassium. The latter can be removed by washing and the former recovered for a repetition of the process, for which it answers any number of times, so that its use does not increase the cost of making the oxygen. One grain of the chlorate of potash gives 0.3915 grains of oxygen, or a bulk of 1.151 cubic inches. By this process, the chlorate of potash is completely decomposed, and its oxygen entirely discharged in the state of gas; and notwithstanding the incandescence which occurs in the glass vessel, the black oxide of copper remains unchanged in composition and properties. In preparing gas by this method a trace of chlorine and sublimed salt pass over, but in conducting the gas through water in a common pneumatic trough, these impurities are absorbed. Two grains of this mixture produce one cubic inch of oxygen gas, and in five minutes 100 cubic inches of gas may be made from two hundred grains. This is a most reliable and convenient mode of making oxygen gas rapidly for experiments. When a large quantity of gas is required, the black mixture may be divided among several small glass vessels half filled with about 500 grains in each, otherwise the disengagement of the gas will be inconveniently rapid. Oxygen gas may be prepared from chlorate of potash alone by heating it in a glass vessel, but the vessel is liable to break owing to the violent boiling of the fused substance. Peroxide of manganese, brick-dust and pumice-stone will abate the boiling action, but these are all inferior to the black oxide of copper. Large quantities of oxygen gas may be made by inclosing dry peroxide of manganese in an iron flask, or a gun barrel and placing it in a furnace or open fire. Any kind of glass vessel (such as a bottle), a bag of india-rubber, or a bladder may be used for containing the oxygen gas.

Oxygen Gas a Supporter of Combustion.—To show the function of this gas in supporting combustion, fill a glass jar with it and secure a crooked wire passing down through the cork. Fasten a small wax taper on the lower end of the wire, ignite it, place it in the middle of the jar and fasten the cork. The flame of the taper will become exceedingly bright while burning; the oxygen gas combines with the carbon and the hydrogen of the taper, producing two products, namely, carbonic acid gas and water. If a piece of red-hot charcoal is placed in an iron spoon and set in a jar containing oxygen gas, the combustion of the charcoal is vivid and brilliant, accompanied with bright sparks.

Iron in Oxygen.—Iron combines with oxygen at a very low temperature in a moist atmosphere, and forms what is commonly called rust or oxide of iron. If we take pure iron and reduce it to powder and throw some of it into the atmosphere, it will unite with the oxygen of the air so rapidly as to form a shower of bright sparks. To burn iron in oxygen

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gas, take a small soft iron wire, twist its lower end into a spiral, dip it into turpentine, ignite it and then insert the upper end of the wire in the cup of a glass jar containing oxygen, and drop the wire into the jar. The flame of the turpentine is communicated to the wire, and it burns with great brilliancy throwing out beautiful sparks which fall down to the bottom of the jar. In this experiment the iron and oxygen combine and form a solid—the oxide of iron, which weighs more than the original wire. When carbon and oxygen unite under combustion they form a gas.

PHOSPHORUS AND OXYGEN.—Place a piece of phosphorus, about the size of a pea, in a little copper gauze cup suspended by a wire, and insert in it a jar containing oxygen gas. The phosphorus will burn with great brilliancy producing phosphoric acid, which falls in white flakes. The light of the burning phosphorus is like that of a miniature sun—it is impossible for the eyes to bear it.

SULPHUR AND OXYGEN.—A piece of ignited sulphur placed in a cup of iron wire and inserted by a wire into a jar of oxygen gas, burns with a beautiful violet-colored scintilating flame. The turnings of zinc, when heated, burn in oxygen gas with a beautiful white light. All these interesting experiments may be performed with very simple apparatus and involve but a trifling expense.

FOREIGN SCIENTIFIC ITEMS.

LONG PISTONS FOR PUMPS.—At a late meeting of the Manchester Literary Society, Dr. J. P. Joule read a paper on a compressing air-pump which was exhibited ; in doing so he referred to the difficulties of realizing in practice the theoretical advantages of hot air and superheated steam in engines, owing to the difficulty of using a lubricating agent. His remarks singularly agree with those expressed on page 314 current volume of the SCIENTIFIC AMERICAN, on the velocity of steam under pressure. Dr. Joule believed, however, that the air-pump he described embraced a mechanical feature which, in a great measure, obviated those disadvantages. Its principle consisted in the use of a very long solid piston, not requiring elastic packing. The cylinders of the pump were two in number, twenty inches long and two in diamter. The pistons were solid, ten inches long, and fitted as accurately to the cylinders as was consistent with freedom of motion. The depth of each piston, as compared with its diameter, rendered the usual guide unnecessary ; the connecting rod was therefore jointed to the top of the piston. Air was compressed in the pump to sixteen atmospheres, the quantity passing the sides of the pistons being very trifling.

WILL-O'-THE-WISP.—A work has lately been published in London by Dr. Phipson, on the phosphorescence of animals, plants and minerals, which contains some remarks about famous old "Will-o'-the-Wisp," *alias* "Jack-o'Lantern," "Spunkie" and *ignis fatuus*. After discussing various theories brought forward to explain it, Dr. Phipson states that in England it is a light which flickers in boggy lands, and is evidently ignited marsh gas (carbureted hydrogen). This gas sometimes spontaneously inflames in coal mines, and its specific gravity is about half that of air. Its faint flame is always invisible in daylight, but becomes visible at night, and sometimes burns wildly because it is bluish in color. A piece of paper has been ignited by a "Will-o'-the-Wisp."

EFFECT OF TOBACCO UPON PULSATION.—Dr. A. Smith, of Manchester, states that tobacco-smoking increases the rate of pulsation in some persons and decreases it in others, hence there is a diversity in the action of tobacco upon different constitutions. He experimented with tobacco upon Dr. Dale, at Scarborough, and found that the effect of tobacco upon him was as follows :—During the first six minutes of smoking there was only an increase in the heat of his pulse of four beats per second, but after that there was a steady increase, and after smoking twenty-one minutes the beats increased to 37½ per minute. After smoking had ceased, the pulsations rapidly decreased. Dr. Smith states that tobacco-smoking acts as a stimulant like alcohol, upon those persons whose pulse is excited. When the body is of full habit, the use of tobacco, he believes, leads to disturbed sleep, and in some cases may end in apoplexy.

SIR DAVID BREWSTER ON THE PATENT LAWS.

We would direct attention to the elegant address of the venerable Scottish philosopher, Sir David Brewster, on another page. He points out in a graphic manner the absurdities of Sir William Armstrong in advocating free trade in inventions as compared with free trade in manufactures and natural products. The latter is free trade with the consent of the producers, the former is trading in the products of others against their consent. The one principle may be in perfect accordance with equity, the other certainly is not. The scientific attainments of Sir David Brewster have gained for him a world-wide reputation. He has always been a friend of the mechanic and inventor, and his object in bringing this subject before the University of Edinburgh was to enlist the judgment of educated persons on the side of right. He informed his audience that it was his firm belief that "every educated man has a substantial interest in a due protection to inventors. This sentence deserves to be written in "letters of gold."

MISCELLANEOUS SUMMARY.

EXTRAORDINARY LUSUS NATURÆ.—J. Way, Jr., of Sewicklyville, Pa., sends us an account of two rainbows which he witnessed during a recent rain storm in his vicinity. He says that the principal bow was of a very brilliant appearance, and that when he observed the two they were parallel, with their extremities nearly perpendicular to the earth, but that they subsequently so modified these positions that the greater arch was crossed by the less, at an angle of 20°. This was again changed by the primary rainbow fading away and the secondary one remaining invested with all its lost radiance. Mr. Way thinks this is most extraordinary, and desires to know if any similar phenomenon has ever occurred.

COARSE BREAD.—Dr. Tucker, in the Maryland *Medical Journal*, denies that coarse bread is useful in dyspepsia. On the contrary, he says, it relieves the constipation at the risk of aggravating the real difficulty. He believes cold and stale bread to be most digestible, and therefore the best for dyspeptics. We can indorse the doctor's opinion from our own experience. It is as he says ; the alleviation is but temporary and the distress from its presence in the stomach is very great. Peach pits have been recommended for this tedious complaint, on account of some fabulous virtues which are supposed to emanate from the prussic acid which is one of their constituents, but we have never found in our own case the slightest relief from any physician, medicine or nostrum whatever.

NEW YORK EXPORTS.—A table of exports furnished by the New York Custom House exhibits the following comparison for the month of October, during the last five years :—

Exports in October,	1858	$8,782,000
do	1859	10,832,300
do	1860	12,682,700
do	1861	13,172,500
do	1862	26,797,100

This is a very healthy and cheering exhibit. It shows that the loss of the cotton exports, which "our misguided Southern brethren" supposed would result in utter paralysis of all Northern trade, is not without its munificent compensations.

A NEW PHILADELPHIA STEAMSHIP.—The new steamship *Continental*, built by J. Lynn, and the machinery by Merrick & Sons, Philadelphia, lately made her trial trip. She is 242 feet in length, and 38 feet beams Her timbers are the best Delaware oak, her bracings are double angle iron, and she is copper fastened. Her propeller is a four-bladed screw 24½ feet in diameter with a pitch of 25 feet. The screw shaft is driven by a direct-acting inverted engine, the cylinder of which is 50 inches bore, stroke 45 inches. A surface condenser is used. She made 11 knots per hour on the trial trip.

UNITED STATES SILVER COIN IN CANADA.—The Montreal *Gazette* mentions that upwards of $50,000 in United States silver coin were imported lately by the American Express Company. During the past two months the average daily receipt has been $30,000 worth a day. At first the silver was easily worked off into the country in grain purchases, but now the farmers are returning it, and the market has become so glutted that the brokers are buying it at 2 to 2½ per cent discount.

A BRAVE OFFICER.—Colonel Bartlett, who commands the Forty-seventh Massachusetts Regiment, was once a captain in the Twentieth Massachusetts. In one of the early battles of the war he lost a leg, but its place has been supplied with a wooden substitute. He now marches with comparatively little difficulty, and rides with perfect ease. This brave officer lately arrived in this city on his way to the seat of war. His conduct is a stinging rebuke to those "brave" shoulder-strapped sons of Mars who invalid themselves on the slightest pretence.

IRON-LINED BARRELS FOR KEROSENE OIL.—A lot of kerosene oil, in iron barrels encased with wood, was stored in a building lately burned in Boston. Some of the oil was saved. The wood was completely burned, leaving the iron lining and the oil highly heated, but not ignited. This test is important to insurance companies and oil dealers, showing there is but little risk from fire when the oil is properly refined and placed in suitable barrels.

A TREMENDOUS GUN IN ENGLAND.—A rifled 600-pounder gun is said to be rapidly approaching completion at Elswick, England. Its weight, when finished, will be 22½ tuns, and its length 14 feet 10 inches. The outer diameter is to be 4 feet 4 inches at the breech, and 1 foot 9½ inches at the muzzle. The bore of the gun will be rather more than 13 inches, and the greatest thickness of metal at the breech, about 19 inches ; at the muzzle, 4½ inches.

A CASE of fatal poisoning from chloroform, taken internally, is reported in a late number of the London *Times and Medical Gazette*. The quantity taken could not be ascertained. The patient was at first, for several hours, insensible, and as though under the ordinary effects of the anæsthetic when inhaled. He then recovered his sensibility, but died under the violent re-action which ensued. The chloroform was swallowed as a remedy for sleeplessness, and was effectual.

DEAD LETTERS.—It has been the habit of the Dead Letter Office to send back only those letters containing matters of value, but for the past year the experiment has been tried of sending all letters, and the result has proved very satisfactory. Not more than sixteen per cent of the letters sent back have been returned to the Department a second time, and the double postage that is charged has realized a surplus over the expense.

ENGLISH IRON-CLADS.—The London *Court Journal* concludes an article on English steam rams as follows : "We have three facts with regard to these iron-clads —first, they are unseaworthy ; second, they are uninhabitable ; and third, they are as vulnerable in vital parts as wooden ones." Very slight objections !

THE cotton mills at Manyunk, near Philadelphia, are now stopped, but all the woolen mills in that manufacturing locality are running day and night, mostly making Government kerseys and flannels. If the machinery of the cotton mills was so altered as to weave woolen yarn, every one of them would be running.

THE *United States Gazette* states that Thomas's flour mills in Willow street, Philadelphia, have been enlarged by the addition of a building, 80 ft. by 120, four stories high. This has increased the capacity of the mill to 1,400 barrels of flour daily. The motive power is an engine of 300 horses' power. The mill is the largest of the kind in the country.

SEVENTEEN THOUSAND PATENTS SECURED THROUGH OUR AGENCY.

The publishers of this paper have been engaged in procuring patents for the past seventeen years, during which time they have acted as Attorneys for more than SEVENTEEN THOUSAND patentees. Nearly all the patents taken by American citizens in FOREIGN countries are procured through the agency of this office.

Pamphlets of instructions as to the best mode of obtaining patents in this and all foreign countries are furnished free on application.

For further particulars as to what can be done for inventors at this office, see advertisement on another page, or address MUNN & Co.,

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RECENT AMERICAN INVENTIONS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week. The claims may be found in the official list.

Rotary Disk Measure.—The object of this invention is an improvement in that class of measures in which the perimeter of a rotary disk is used for the purpose of determining the linear dimensions of plane or curved surfaces. The invention consists in the combination with the rotary disk and with the cog wheels which transmit the motion of said disk to the index hands, of a case of cylindrical form, which incloses the whole measure with the exception of a small portion of the disk, and which is provided with a pointer in such a manner that the disk can be started accurately from any desired point, and, at the same time, the instrument is inclosed in a small compass and can conveniently be carried in the pocket; it consists further in the application to the periphery of the rotary disk, of a strip of india-rubber or leather for the purpose of preventing the disk from slipping while being carried over the surface to be measured; it consists further in the application to the case which incloses the measuring disk and wheels, of a pointed radius bar in combination with a suitable scale marked on the dial plate of the case in such a manner that by inserting the point of the radius bar in the point of the angle and carrying the disk over the arc measuring said angle, the number of degrees contained in the arc and also its length may be determined with ease and facility; it consists, finally, in the arrangement of a compass inserted in the handle, which serves to carry the disk over the surface to be measured in such a manner that the direction in which the disk moves can be observed at any point. E. V. Lawrence, of Brooklyn, N. Y., is the inventor of the improvement.

Refining Sugar.—In the process of sugar refining, after the first crop of crystals has been obtained from the clarified and decolored sirups of raw sugar, the mother liquor is frequently found to be acid, such condition being caused by the development of saccharic acid (C_6 H_4 O_7 H O). Instead of using lime water or milk of lime to neutralize the acid this invention consists in the use of liquid ammonia for that purpose. The quantity used will depend upon the amount of acid developed, and should be sufficient to keep the liquor or sirup neutral, and thereby prevent the formation of uncrystallized sugar; and the mode of using it is the same as that heretofore practiced with lime water and milk of lime. The advantage resulting from the use of the liquid ammonia instead of lime water or milk of lime consists in its having a volatile base. The invention is also applicable in the manufacture of sugar from molasses, the liquid ammonia being introduced in sufficient quantity among the molasses, and the effect being the same as in the process of refining sugar. Edward Beanes, of Havana, Cuba, is the patentee of this device.

Type-setting Machine.—This invention relates to a new and improve machine for setting up types, that is to say, for depositing them in the stick preparatory to placing them in the galleys from which they are taken and locked up in the form. The object of the invention is to obtain a suitable device for the purpose specified and one which may be operated or manipulated or operated correctly by almost any person with but very little practice. The invention consists in placing the type in a case formed of cells, each of such a width as to admit of a single row of type, and using in connection therewith a sliding stick and certain mechanism arranged in such a manner that the stick may be shoved along below the case and brought in a proper relative position with any of the rows of type, and the type discharged from the case and properly deposited in the stick: O. L. Brown, of No. 4 Howard street, Boston, Mass., is the inventor of this device.

How to make Sal-ammoniac.—To form the sal-ammoniac of commerce, the ammonial water obtained in gas works is to be saturated with hydrochloric acid (muriatic acid). It is usually evaporated in vessels of lead and then run into wooden coolers. The salt is then to be dried in stoves, and finally sublimed in iron pots with large domes.

Scientific Division of Labor.

Dr. Wayland in his "Political Economy" relates that, during the French Revolution, the Government was anxious to obtain a series of mathematical tables, to aid in the extension of the decimal system. M. Prony, who superintended the work, having read, in Adam Smith's "Wealth of Nations," the chapter on division of labor, and being deeply impressed with its truths, arranged and adopted a plan by which the work was divided into three distinct parts. The most abstruse and difficult of these was to ascertain the analytical expression most readily adapted to simple calculations, and capable of being performed by many individuals at the same time. This portion of the work was committed to five or six of the most eminent mathematicians of France. The next part was to convert into numbers the formulæ thus made; this was given to seven or eight persons who possessed considerable knowledge of mathematics. But by far the greater bulk of the labor consisted in finishing these tables by long but simple calculations in addition and subtraction, and this was performed by sixty or eighty persons of limited knowledge, whose service could be obtained at a very small expense. These tables, thus formed, occupied seventeen large folio volumes. Had the few learned mathematicians performed the whole of this work, it is easy to see that the consumption of time and waste of power would have been enormous.

Boring for Water.

A news letter from Corinth, Miss., says that, in consequence of the scarcity of drinkable water in that neighborhood, the authorities have been engaged in boring wells to furnish a supply. Three negroes, a mule, two or three pulleys, with their ropes and tackle and the simple auger, can "sink" a well in a short time. The soil is so free from sand and gravel that there is no difficulty in the operation. An auger of three inches diameter is first used, and afterward one of eight or nine inches, which is the final diameter of the well. The mule, harnessed to a huge clevis which encloses its body, and is fastened over its head to the end of a horizontal lever, raises the auger from the well by walking round in a little circle, and thus winding the rope upon which the auger is suspended around an upright cylinder. When it is necessary to unwind, the driver gives the command, "halt!" and the mule stops; "turn!" and he turns in his tracks; the clevis being made so as to turn where it connects with the lever. When the boring is completed a tubing plank is put down to keep the wall from crumbling in. The water is then drawn by a long cylindrical bucket, open at the top, and having a valve at the bottom opening upward. Sufficient weight to sink it is attached to the bottom. As it sinks the water rushes in through the valve, which closes as soon as the bucket begins to be drawn up.

Light, Heat and Motion.

The scientific doctrine is now very generally inculcated and believed, that heat is the result of motion, and that light is also due to an undulatory motion. Some confusion of ideas has been experienced by many persons with respect to a correct understanding of this subject. It should be understood, when the statement is made, that heat is caused by motion or is developed by motion, that these are simply expressions to convey an idea of the operations of nature. Motion means the relative change in place, position or condition of bodies. The expression, "force is the cause of motion," is also frequently used. But this is also a simple statement for the operations of matter, and is equivalent to saying "an apple falls by gravitation." In this use of the term, gravity is the understood cause of the motion; it is a force of nature, but the great First Cause is beyond the comprehension of man's limited intellect.

Ignorance of Welsh Quarrymen.—A singular instance of ignorance is said to have lately occurred at the Penrhym (Wales) quarries. A charge of thirty-four pounds of powder had been placed in a hole for a blast, but, having got damp, would not explode; upon which one of the four men engaged thrust in a red-hot iron, under the impression that damp powder would only "squib." It, however, immediately exploded, killing one and dangerously wounding two others. The fourth escaped with little injury.

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING NOVEMBER 25, 1862.

Reported Officially for the Scientific American.

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 2, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publisher of the Scientific American, New York.

36,985.—J. E. Atwood, of Bucksport, Maine, for an Improvement in Steam Engines:

I claim, first, The combination of the generator, S S, with the cylinder, A, when constructed substantially as described for the purpose set forth.

Second, I claim the combination and arrangement of cylinders, A, with cylinders, x x, steam generator, S S, reservoir, F F, and levers, J J, operating in the manner and for the purpose substantially as set forth.

Third, I claim the combination of pump, E, spiral spring, C C, and eccentric, D D, in the manner and for the purpose substantially as described.

36,986.—S. S. Bartlett, of Providence, R. I., for an Improvement in Bolsters for Spinning Frames:

I claim an improved bolster in which the screw thread is cut by a gear or wheel in such a manner as not to vary the internal diameter of the bearing surface of the bolster, but so as to leave the diameter the same throughout as it was before the screw thread was cut.

36,987.—J. L. Bates, of Providence, R. I., for an Improvement in Packing for Steam Engines:

I claim, first, The combination of the fillet or strip of cork, A, and the covering, b, composed of twine covered with soft cotton or other soft fibrous material, substantially as herein specified.

Second, The braiding, c, applied in combination with the fillet or strip, A, and covering, b, substantially as and for the purpose herein specified.

[This packing is composed of a fillet or strip of cork covered with twine, which has been first covered with soft cotton or other soft fibrous material.]

36,988—Edward Beanes, of Havana, Cuba, for an Improvement in the Refining and Manufacture of Sugar:

I claim the use of ammonia for neutralizing the acid developed in the manufacture and refining of sugar, substantially as herein described.

36,989.—N. A. Boynton, of New York City, for an Improvement in Heaters:

I claim, first, The open air space, a, between the magazine, C, and the radiator, G.

Second, Having the radiating chamber, G, made to extend from the top of the magazine nearly to the top of the firepot, in combination with the air space, a, as herein shown and described, so as to inclose or nearly inclose the magazine, but leaving an open space between the base of the radiator and the firepot, for the entrance of air and its contact with the firepot, with room for the rise and discharge of the air through the space, a, all as set forth.

Third, The combination of the radiator, G, made as above described, and the air space, a, with the magazine, C, the firepot, A, and the flues, F, in the manner herein shown and described.

[We noticed this invention in the number of our paper for last week—page 363.]

36,990.—J. S. Brooks, of Rochester, N. Y., for an Improvement in Sad-iron Heaters:

I claim the sad-iron heater constructed as shown and described, and forming a new article of manufacture.

36,991.—O. L. Brown, of Boston, Mass., for an Improvement in Machines for Setting Up Types:

I claim, first, The employment or use of a type case, A, provided with a series of type cells, a, in combination with a sliding stick, C, provided with a plate, H, plunger, t, and slide, S, so arranged that the stick may be moved along, and its space, n, adjusted in line with any of the type cells, a, in the case, A, and the type discharged from the case into the stick, substantially as herein set forth.

Second, Operating the slide, S, and plunger, t, through the medium of the lever, P, provided with a spring, Q, a pawl, b′, and a lever, T, provided with a notch, a′, and having the plunger rod, U, attached to its upper end, all arranged as shown, whereby the types are forced upward and out from the cells, a, of the case, A, and into the space, n, of the stick, as set forth.

Third, Providing the stick, C, with an adjustable side, a*, and an adjustable end plate, I′, in connection with a self-adjustable bar, K, placed in the space, n, and secured in position by the pawl, O, and rack, o, whereby the stick may be adapted for receiving lines of types of greater or less length and width, as may be required, and the lines of type when "set up" forced into the stick, as herein described.

36,992.—A. H. Chaplin, of Adrian, Mich., for an Improvement in Horse Rakes:

I claim the yokes, G G, and springs, Q Q, arranged to work in joint operation with handles, D D, shafts, H H, and teeth, C C, as above described and set forth.

36,993.—Alinzor Clark, of Saint Johnsville, N. Y., for an Improvement in Apparatus for Cutting Tined Implements from Metal Plates:

I claim the construction of each die of a series of cutting plates, d d e or d′ d′ e′, and interposed packing plates, f f or f′ f′, the whole secured together in a box or stock, B or B′, by set screws, g g or g′, or their equivalents, substantially as herein set forth.

[This invention consists in the construction of a pair of dies to cut the blanks for two forks, rakes or tined hooks, from a piece of steel plate, in such manner that the metal cut from between the tines of each forms the tines of the other, thereby enabling the forks to be made without any material waste of stock. It also consists in the construction of the dies for cutting out the blanks of a series of plates set up edgewise, with interposed packing plates secured together in box like stocks by set screws or their equivalents.]

36,994.—J. E. Earle, of New Haven, Conn., for an Improved Clothes Frame:

I claim the combination of bracket, A, and spindle, D, with the sockets, F, and bars, G, constructed and operating in the manner and for the purpose substantially as described.

36,995.—Perry Dickson, of Utica, Minn., for an Improvement in Propellers for Land Conveyance:

I claim the applying of the power of the engine to the rod, I, of the rock bar, J, through the medium of the slide, G, pendant rod, F, and cross head, E, the slide being adjusted on the rod. F, and all arranged substantially as and for the purpose herein set forth.

[The object of this invention is to obtain a propeller by which the application of the driving power may be varied as circumstances may require, so that, for instance, in ascending eminences, the speed may be decreased and a proportionate increase of power obtained, and in passing over level surfaces the utmost capacity as regards speed of the propeller and driving power obtained.]

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36,996.—Elbridge Gale, of Kendall, Ill., for an Improvement in Portable Fences:

I claim a wire fence constructed in sections, with the posts set obliquely and braced as described, the whole constructed and arranged in the manner and for the purpose as set forth.

36,997.—A. Heavener, of Plano, Ill., for an Improvement in Water-proof Thresholds:

I claim the valve, G, with hinge, I, and spring, J, as described, also the groove or channel, K, as described and for the purpose specified.

36,998.—C. B. Ingersoll, of Morris, Ill., for an Improvement in Cultivators:

I claim the combination and arrangement of the draught pole, D, the double tree, A, the beams, E, the cross beam, F, the standards, G, the supports, C, and the whiffletrees, B, when all are constructed, arranged and operating, substantially as and for the purposes herein delineated and set forth.

36,999.—William Jones, of Wilson, Minn., for an Improvement in Plows:

I claim the combination of the mold boards, C C, shares, F F, land sides, D D, and standards, E E G, with the plate, H, guide plate, J, lever, K, and beam, A, all in the manner herein shown and described.

[This invention consists in the employment or use of a double mold-board or two mold-boards attached back to back, and having proper shares, land sides and standards connected to them, the standards being attached at the upper ends to a semi-circular plate, which is secured to the under side of the beam by a pivot bolt, and all arranged as shown and used in connection with a catch, whereby the mold-board may be turned to either side of the beam, and a right or left-hand plow obtained, as may be desired.]

37,000.—T. B. Kelly, of Hannonsburgh, Pa., and L. W. Kelly, of Brunswick, Ohio, for an Improvement in Blacksmiths' Tools:

I claim the construction of the handle, A A, with the slot therein at F F, and claw, B, attached thereto by the joint, C, in combination with the knife blade, E, when the same are constructed as described and for the purpose set forth and in the aforesaid combination.

37,001.—Louis Kolloff, of Brooklyn, N. Y., for an Improvement in Devices for Closing Gates:

I claim, in combination with a gate or door, the socket on the jamb or post, A, the bar, G, and adjusting mechanism, b c, substantially as described and for the purpose set forth.

37,002.—E. V. Lawrence, of Brooklyn, N. Y., for an Improvement in Rotary Disk Measures:

I claim, first, The arrangement of the cylindrical case, B, with its pointer, a′, in combination with the rotary disk, A, wheels, b b′ c c′ d d′, and index hands, C D, all constructed and operating in the manner and for the purpose shown and described.

Second, The application of a strip, f, of india-rubber or other suitable material to the edge of the rotary disk, A, when said disk is used, as and for the purpose set forth.

Third, The arrangement of the radius bar, E, with point, g, in combination with the case, B, carrying the measuring disk, wheels and indices, all constructed and operating substantially as and for the purpose described.

Fourth, The use of a compass in combination with the handle, F, of the case, B, as and for the purpose specified.

37,003.—Henry Loewenberg, of New York City, for an Improvement in Hoop Skirts:

I claim an improved hoop skirt, having its body made with arcs or parts of hoops, instead of entire hoops, arranged in manner or with reference to each other, and supported by bands, elastic or otherwise, so as to operate substantially as specified.

37,004.—T. J. Mayall, of Roxbury, Mass., for an Improvement in Revolving Fire-arms:

I claim in fire-arms, of otherwise ordinary construction and operation, the employment of changeable breeches or breech sections adapted for reception of different kinds of ammunition, in combination with a hammer, so constructed and arranged in relation to the said breeches or breech sections as to strike, when operated, both the percussion cap and the head of the solid cartridge in the proper position for causing the ignition of either charge used, as the case may be.

37,005.—William Neyins, of Irving, N. Y., for an Improvement in Cultivators:

I claim the rigid angular wings, C C, connected with the beam, A, and made adjustable by means of the brace bar, D, eye bolts, d d, and adjusting holes, f f, or their equivalent device, the whole arranged, combined and operating substantially as and for the purposes herein set forth.

37,006.—Dexter Pettengill, of Delhi, N. Y., for an Improved Slide for Breast Straps for Harness:

I claim the slide and its application to the breast straps of harness, in the manner and for the purposes set forth in the above specification.

37,007.—W. B. Rhoads, of South Dedham, Mass., for an Improved Wringing Machine:

I claim, first, Lever springs as means for producing pressure on and allowing yield of the moving roller of wringing machines, substantially as set forth.

Second, The three-pronged device, m m m′, with the shouldered screw, J, nut, S, and wringing machine standards, A A, substantially as and for the purpose set forth.

37,008.—J. M. Riley, of Newark, N. J., for an Improved Furniture Caster:

I claim the band or collar, D, when applied to the arbor, B, at the junction of the fork, C, and used in combination with a spring, E, or other fastening placed between the band or collar, D, and the upper end, bearing, or center, a′, of the arbor, as herein set forth:

[This invention consists in the employment or use of an anti-friction band or collar placed on the arbor of the caster and fitted within the tube of the same at a point between the top of the fork in which the roller is placed and the spring or fastening which secures the arbor in the tube, all being arranged in such a manner that a very strong and durable caster is obtained, one well calculated to resist any lateral strain to which it may be subjected in moving about the piece of furniture to which it may be attached, and still be capable of turning easily in its tube so that the roller may be readily conformed to or be brought in line with the direction in which the piece of furniture is to be moved.]

37,009.—Cyrus Roberts, of Three Rivers, Mich., for an Improvement in Cultivators:

I claim, first, The combination of a foot lever, hand lever and crank a xle with a driver's seat, when arranged for joint operation, substantially in the manner described for the purpose set forth.

Second, The combination of the hind feet, K, with the removable projecting arms, K, when arranged and operating substantially as and for the purposes described.

37,010.—Cyrus Roberts, of Three Rivers, Mich., for an Improvement in Cultivators:

I claim, first, Mounting the feet in a frame having a lateral sliding movement, substantially as described, in combination with stay chains attached at one end to the feet and at the other to a fixed point on the main frame, as set forth, for the purpose of keeping the feet always in the same plane relative to the frame or to the path of the machine, notwithstanding said lateral movements.

Second, The combination of the rod, G′, sliding frame, g, and lever, g3, when arranged and operating substantially as and for the purpose described.

37,011.—Eben A. Sawyer and J. B. Nichols, of Portland, Maine, for an Improved Apparatus for Reefing Top-sails and Courses of Ships:

I claim, first, Running the spilling lines, H, through reef band, b, and through the top sail, G, at points near the top mast, B, or center of the sail, G, and extending their ends in front and in rear of the sail, up to the cross-tree, I, substantially in the manner and for the purpose described.

Second, Providing the blocks, g, on the yards of top-sails and courses and arranging brail lines, J J, to pass independently of one another from the top of the yards down in front of the sails, through the sails up behind the sails, over the blocks, g, and down to the deck, in the manner and for the purpose described.

Third, The arrangement together on the top-sail of the spilling lines and brail lines, in the manner and for the purposes described.

37,012.—A. B. Sprout, of Hughesville, Pa., for an Improvement in Horse Rakes:

I claim, first, Securing the teeth, H, in position by means of the fulcrum bar, F, connected by the arms, K K, to the shaft, J, as herein shown and described.

Second, Poising or balancing the teeth, H, near the center of the same upon a fulcrum bar, F, hinged to the main frame in the rear of the shaft, J, and axle, A, substantially as set forth, so as to adapt the teeth to be more readily raised by the lever, M.

Third, Securing the bar, L, adjustably upon the arms, K, so that the said bar may be set in or out, in order to adapt the rake to work with light or heavy hay.

Fourth, Providing the bar, L, with the removable weight, b, substantially as and for the purpose set forth.

37,013.—O. G. Stillman, of Fabius, N. Y., for an Improved Means of Affixing Defensive Armor Plates to Marine Batteries:

I claim combining any desired number of groove-edged casing plates, a a, with each other and with the exposed surfaces of a vessel by the aid of a series of grooved-edged and concealed ribs, b b, and the requisite number of stay-bolts, all substantially as herein set forth.

37,014.—N. F. Stone, of Athens, Ill., for an Improvement in Machines for Gumming Saws:

I claim the stock, A, formed of the two cheek-pieces, a a′, set screw, C, and shank, b, in combination with the frame, D, provided with the rotary cutter, F, and the feed screw, B, passing through a nut, c, on shank, b, and fitting in the frame, D, all arranged as and for the purpose herein set forth.

I further claim the particular manner of attaching the frame, D, to the stock, A, to wit, by having the caps, k k, of the bearings, i i, of the cutter-shaft, E, bear against the front sides of the cheek-pieces, a a′, and having the front side of the frame-work within the guides, f f h h, formed at the ends of arms, e e g, connected with the upper and lower ends of the cheek-pieces, as and for the purpose set forth.

[This invention relates to an improved saw-gumming device of that class in which rotary cutters are employed, and consists in a novel construction and arrangement of the parts, whereby it is believed hat a more simple and efficient device is obtained than those hitherto used for the purpose, and one capable of being more readily manipulated and applied to its work.]

37,015.—Orin Sweet and M. E. Hicks, of Providence, R. I., for an Improvement in Packing for Rotary Pumps:

We claim the insertion of these bronze-metal rings into the engine head, and the peculiar mode by means of the cog wheels, of adjusting the said rings which serve as a packing for the pumps or engines, producing the effect of keeping the pumps or engines watertight.

37,016.—C. R. Tuttle, of New Brighton, Pa., for an Improvement in Churns:

I claim, first, The box, H, provided with dovetail or wedge-shaped projections, c c′, adapted to fit corresponding mortises in a metallic support or bracket, F, when combined and arranged to operate in the manner and for the purpose specified.

Second, The wing or dasher, K, and clamp, m, provided with set screw, n, in combination with the rods, g g, when arranged to operate in the manner and for the purpose specified.

[The object of this invention is to expedite the removal of the dasher from the cream vessel, when it is desired to inspect its contents, or to cleanse either the dasher or vessel, or both after a churning; and with equal facility to adjust the power within the latter in proper working order when desired for use, and also to enable the dashers (of which there are two) to be adjusted relatively to each other, to adapt the churn with like efficiency to churn a large or small quantity of cream; and further, to enable the upper dasher to be placed in a position most suitable for gathering the butter, and to these ends, the invention consists, first, in supporting the upper end of the central dash rod in a box which is furnished on two opposite sides with dovetail or wedge-shaped projections, adapted to fit corresponding grooves in a bracket, and thereby to hold the dash rods in position to have their pinion wheels properly gear into the main driving wheel. The invention consits, secondly, in supporting one of the dashers by a screw clamp, whereby it may be adjusted to effect the result before mentioned.]

37,017.—Daniel Treadwell, of Cambridge, Mass., for an Improvement in Devices for Firing Cannon:

I claim the employment in combination with the vent of a gun of a recess or receptacle upon the exterior thereof for containing a primer; and a vent stopper for closing the same; and a primer with an expanding case which serves as a packing to close the joint and prevent the escape of the gas, substantially as described.

37,018.—S. H. Titus, of St. Louis, Mo., for an Improved Coating for Oil Barrels and Casks:

I claim the solution of gelatine compounded substantially as specified, and its application to the interior of casks and other vessels, in manner and for the purpose substantially as described.

37,019.—L. B. Waterman, of Chicago, Ill., for an Improvement in Cultivators:

First, I claim as my invention the peculiar arrangement of the beams, J K M, and the bar, L, in combination with the upper frame work, when operating substantially as described and for the purposes specified.

Second, I claim the arrangement of the lever, I, the chain, h, and the pulley, H, when the same are used in connection or combination with the grooved axle attachment, E, and the slide, F, the whole being arranged and operating as and for the purposes set forth.

Third, I claim the adjustable bow, G, when arranged with the bar, J, as and for the purposes set forth and delineated.

37,020.—L. W. Williams, of Nevada, Cal., for an Improvement in Quartz Crushers:

I claim the segmentary grinders, G G G G, or their equivalent, in combination with the inclined or inclined curved surfaces, I I I, operating substantially in the manner and for the purposes hereinbefore set forth.

I also claim the springs, S S S S, or their equivalent, in combination with the grinders, G G G G, and the inclined or inclined curved surfaces, I I I, the whole operating substantially in the manner and for the purposes hereinbefore described.

37,021.—John Williston, of Vallejo, Cal., for an Improvement in Hose Coupling:

I claim the ribs, A, and lugs, B, Fig. 2; the slots, C C, Fig. 4; and the set or tightening ring, Fig. 5; the whole constructed and operating substantially as herein described and set forth.

37,022.—Lorenzo Winslow, of Rochester, N. Y., for an Improved Method of Fastening Bits or Augers in their Stocks or Handles:

I claim the combination of the rod and spring, r s, carrying the roller, b, with the inclined plane, d, when arranged in connection with a stock or handle, in the manner and for the purpose substantially as described.

37,023.—G. W. Woolley, M. D., of New York City, for an Improvement in Tubular Forceps:

I claim the combination of the tube, b, tube, 3, and stiletto, substantially in the manner set forth.

37,024.—H. M. Wyeth, of Bloomfield, Iowa, for an Improvement in Pumps:

I claim the combination of the central division piece, C, with its holes, c and d, and valves, f f, with the other parts of the pump, the whole constructed and arranged for operation substantially as shown and described.

37,025.—J. W. Armstrong and John Taylor, of Augusta, Ky., for an Improvement in Breech-loading Fire-arms:

I claim, first, A clearer, D, of any suitable form working within or upon a cam groove or rib on the axis pin, and advanced or retracted by a rotary motion of the barrel, substantially as set forth.

Second, The segment, I 4 5, employed to govern the motion of the spring catch, E, substantially in the manner explained.

Third, The combination of the stud, b′, and grooves, c c′, with the axis pin, C, and socket, b, to secure the barrel to the stock and permit their detachment, as explained.

[This invention consists, first, in a device for ejecting the empty shell by the rotary motion by which the barrel is opened for the reception of a new cartridge, and secondly, in an improved manner of attaching the barrel to the stock.]

37,026.—Serena E. L. Croghan, of Flatbush, N. Y., administratrix of St. George Croghan, deceased, for an Improvement in Hoisting Machines:

I claim the combination of handles, M N, lever, H, spring arms, F G, ratchet wheels, D E, drum, C, operated by ropes in manner and for the purpose herein described.

37,027.—John Magee, of Chelsea, Mass., assignor to the Norton Furnace Company, of Norton, Mass., for an Improvement in Heaters:

I claim supporting each of the air conduits, G, by yielding joints, substantially as set forth, arranged at both ends of the same, and with respect to the top and side of the radiator, as specified.

I also claim the combination of the sand and fusible metal joints, constructed and arranged substantially in manner and so as to operate together as specified.

37,028.—John Ellis, of Detroit, Mich., for an Improvement in Gate Latches:

I claim the pendulated stop, E, and pendulated catches, F, when arranged and operated as and for the purpose specified.

37,029.—D. F. Drake, of Somerville, Mass., assignor to A. G. L. Drake, of Hampden, Maine, for an Improved Coat Sling or Carrier:

I claim the said improved coat sling or carrier as constructed with a brace strap, C, combined with a back plate, A, and its shoulder straps, B B, and so slung or arranged below the said back plate that the said strap, C, when in use, will go across the back of the wearer and below his shoulder blades, and thence underneath the arms and upward to the shoulder straps, B B, substantially as described.

EXTENSION.

5,935.—John Lightner, of Roxbury, Mass., for an Improvement in Boxes for the Journals of Railway Cars. Patented Nov. 21, 1848:

I claim the movable plate, K, and aperture, S, made through the front of the box, in combination with one another and the composition bearing and enclosing case, and made to operate substantially as above specified.

Books and Publications Received.

THE ATLANTIC MONTHLY. Published by Ticknor & Fields, Boston.

We have received the December number of this excellent magazine, which, as usual, is replete with entertaining and instructive matter.

THE CONTINENTAL MONTHLY. Henry Dexter & Sinclair Tousey, New York, agents for this city.

In these days of partizan feeling and political discord it is refreshing to read such able, fair and liberal-spirited articles, on the leading questions of the times, as are regularly published in the pages of the *Continental Monthly*.

ANDRU TAVERNAY, OR THE DOWNFALL OF FRENCH MONARCHY; the conclusion of the "Countess de Charny," "Memoirs of a Physician," "Queen's Necklace" and "Six Years Later," all works of Alexander Dumas. Published by T. B. Peterson & Brother, Philadelphia, and sold by F. A. Brady, of this city.

A fine translation of this great work has just emanated (in two volumes—price $1) from the prolific press of the above-named publishers; it is powerfully written, and altogether a very entertaining novel of the historic class.

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Models are required to accompany applications for Patents under the new law, the same as formerly, except on design patents when two good drawings are all that is required to accompany the petition, specification and oath, except the government fee.

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application at this office. Address MUNN & CO.,
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PATENTS FOR SEVENTEEN YEARS.

The new Patent Laws enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the government fee required on filing an application for a patent is reduced from **$30** down to **$15**. Other changes in the fees are also made as follows :—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for Design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, excepting reference to such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English Russian, Spanish and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms.

During the last sixteen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN ; and as an evidence of the confidence reposed in ou Agency by the Inventors throughout the country, we would state that we have acted as agents for more than FIFTEEN THOUSAND Inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of Inventors and Patentees at home and abroad. Thousands of Inventors for whom we have taken out Patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the Inventors whose Patents were secured through this Office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive Offices, and we are prepared to attend to Patent business of all kinds in the quickest time and on the most liberal terms.

The Examination of Inventions.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

Preliminary Examinations at the Patent Office.

The service we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a Patent &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. More than 5,000 such examinations have been made through this office during the past three years. Address MUNN & CO., No. 37 Park-row, N. Y.

How to Make an Application for a Patent.

Every applicant for a Patent must furnish a model of his invention if susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fees by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & Co., No. 37 Park-row, New York.

Foreign Patents.

We are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business, we have offices at Nos. 66 Chancery-lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

Circulars of information concerning the proper course to be pursued in obtaining Patents in foreign countries through our Agency, the requirements of different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our Branch Offices.

Rejected Applications.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief story of the case, inclosing the official letters, &c.

Assignments of Patents.

The assignment of Patents, and agreements between Patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park-row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park-row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park-row, New York.

Caveats.

Persons desiring to file a Caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention The government fee for a Caveat, under the new law, is $10. A pamphlet of advice regarding applications for Patents and Caveats, in English and German, furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row, New York.

Notes and Queries

M. G. C., of Mass.—The mere substitution of one known material for another is not patentable. Any novel way of combining the parts might be the subject of a patent.

R. H., of N. Y.—We have noted your complimentary remarks in reference to our subscription terms, and hope you will disseminate the same feeling among your acquaintance. You are correct in your views in regard to the practicability of burning wet tan bark ; if it supplies sufficient heat to generate steam under the circumstances of a favorable wind, it will certainly do so, provided you retain these conditions artificially, when the natural forces are adverse. Before applying a blower, however, you should examine your chimney and see if there is not some defect in it which prevents it from drawing properly. You cannot patent the application of a blower for this purpose. The ash-pit is the proper place to introduce the blast. The carbonate of barytes is not found in this country, as far as we know. It comes from England. The sulphate of the same mineral is found abundantly in Winchester, Conn.; it is worth twenty dollars per tun.

R. S. C., of Pa.—Naptha and petroleum are two very different productions. Alcohol and petroleum benzine do not mix together like alcohol and water, but if you mix equal parts of alcoho and benzine, and stir them together, then add gum copal in powder[1] the gum will be dissolved and a varnish produced, which cannot be effected by the alcohol and benzine alone.

F. J., of Pa.—We cannot explain the cause of the dark appearance that often appear under the eyes. Such matters of investigation properly pertain to the medical fraternity.

J. W., of N. Y.—It is not probable that an inventor's patent could be taken from him by an ordinary attachment for debt, but if his effects should pass legally into the hands of a receiver the patent could, we think, be sold as a part of his effects. This is still, however, an unsettled question we believe.

R. C., of N. Y.—A very small quantity of the sulphate of ammonia mixed with starch used for starching linen and cotton fabrics, renders them flame-proof. They will burn but not in a flame; they are therefore, rendered partially non-inflammable and more safe to wear.

O. S., of Philadelphia.—We have received tracings and descriptions of your air engine, and have no doubt that you can obtain a patent on your improvements. We do not give opinions upon any invention unless we have positive evidence of its practicability.

W. F. D., of C. W.—We have read with interest your article discussing a new system of arithmetic which came before the Polytechnic Institute. We do not care to open our columns to a topic of this character, as it might lead to an endless variety of dry suggestions not suited to our journal. We will send your paper to the Institute.

D. L. L., of N. Y.—Paris white mixed with a little oil applied to the glass of a window, will permit some light to pass through, and yet prevent persons from seeing through the glass. A piece of putty or white soap rubbed over the surface of the glass, inside, will answer the same purpose in a moderate degree. Gum arabic makes a very good mucilage for sticking paper, but dextrin is the common mucilage that is now so extensively used for self-sealing envelopes.

F. H., of Mass.—We have noted your remarks in reference to the most economical plan of steam engine, and shall give the subject attention. Opinions have been expressed in former numbers of this journal relative to the matters adverted to in your letter. We shall publish an article shortly in reference to them.

C. M. B., of Mass.—Your conclusions in regard to the difficulties under which a correspondent of ours labored in operating his boilers are correct and practical. The arrangement of your plan is good, but it amounts to the same thing in substance as we proposed, with the disadvantage of costing considerably more. We wish that all correspondents would have as much consideration for editorial eyes as you have, and would write as clear and legibly.

R. K. V., of N. Y.—A clear strong solution of logwood applied hot to the white portions of your walnut will stain it, without leaving a residue on the surface of the wood. After it becomes dry, apply a warm weak solution of copperas upon the logwood and it will become quite black. Rub down the wood and apply oil, and you will have a jet black shining surface.

Money Received

At the Scientific American Office on account of Patent Office business, from Wednesday, November 26, to Wednesday, December 3, 1862 :—

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Persons having remitted money to this office will please to examine the above list to see that their initials appear in it, and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, and inform us the amount, and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from November 26, to Wednesday, December 3, 1862:—

W. J. W., of N. Y.; H. H. E., of Conn.; H. M., of N. Y.; G. H. F., of N. Y.; G. C., of N. Y.; P. & R., of N. Y.; J. H. T., of Col. Ter.; I. C., of Tenn.; G. A. W., of N. Y.; De L., of Paris; J. L. P., of N. Y.; J. G., of N. Y.; J. F. T., of N. Y.; H. M., of Wis.; J. D., of Ky.; P. V. C., of Mo.; D. Van H., of Ind.; H. B. Jr., of N. Y.; M. N. F. of Md.; E. E., of Ill.; W. S. T., of Iowa.

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PATENTS, &C., FOR THE EUROPEAN MARKET. MR. THOMAS RAWLINGS respectfully informs his friends and others, who have American interests to dispose of in Europe, that he has taken his departure for England, for the purpose of establishing an agency there, devoted especially to the negociation of patents and other American interests. All letters for him, addressed (prepaid) to the care of Messrs. SMITH, TAPSCOTT & CO., Shipping Merchants, Liverpool, will be duly forwarded and promptly answered. 24 eow2*

RELIEF FOR THE DEAF.—HASLAM'S ARTIFICIAL Ears can be worn round the head and concealed from view. Send a postage stamp to HASLAM BROTHER, 181 Broadway, New York, and a descriptive circular of the above instrument will be sent to any address. 24 2*

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THE WORKING FARMER FOR 1863. VOL. XV. A Monthly Publication, Devoted to Agriculture, Horticulture, Floriculture, Gardening, Applied Science, Mechanics, Literature, the Arts and Current Events. Prof. JAS. J. MAPES, Agriculture Editor, assisted by able contributors, published on the first day of each month, at 126 & 132 Nassau street, New York. The subscriber having assumed the publication of the *Working Farmer*, in addition to his own labors as Editor, will enjoy the valuable aid of Prof. J. J. MAPES, the veteran Agriculturist, whose name has been so long and honorably connected with this periodical. Under his control, we have full confidence that the *Working Farmer* will continue to diffuse that thorough acquaintance with practical Agriculture, which has placed it so far in advance of its cotemporaries.

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Consultation may be had with the firm between NINE and FOUR o'clock, daily, at their PRINCIPAL OFFICE, No. 37 PARK ROW, NEW YORK. We have also established a BRANCH OFFICE in the CITY OF WASHINGTON, on the CORNER OF F AND SEVENTH STREETS, opposite the United States Patent Office. This office is under the general superintendence of one of the firm, and is in daily communication with the Principal Office in New York, and personal attention will be given a the Patent Office to all such cases as may require it. Inventors and others who may visit Washington, having business at the Patent Offices are cordially invited to call at their office.

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Grooved Frictional Gearing.

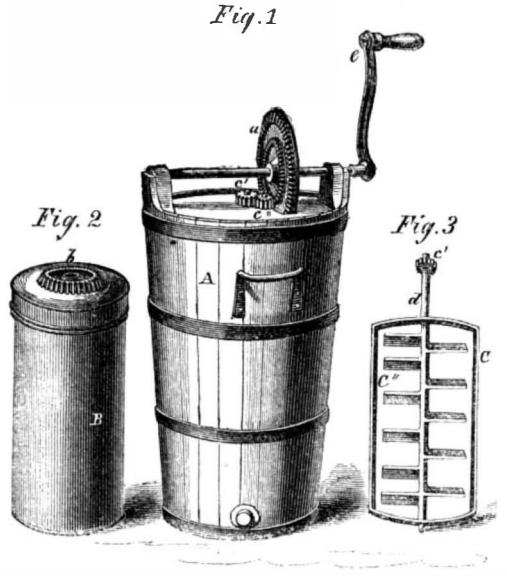
Frictional gearing, instead of toothed wheels, seems to be coming into more and more extensive use. The mode by which the motion is communicated is as follows :—The peripheries of the wheels are provided with Λ-shaped grooves around their circumferences, the extreme points of the Λ being removed to insure a good bite ; and each Λ fitting into the recess formed by a *W* on the other wheel ; the smallest possible pressure is thus made to give a very large amount of force. It is calculated that the adhesion or driving hold of the surfaces of these grooved wheels is about nine times that of plain surface frictional wheels. When working at 1,000 circumferential feet per minute the contact pressure requisite for transmitting a standard horse-power is 22 lbs. ; at double that circumferential speed, 11 lbs. ; and in the same relative proportions at other speeds ; a wheel 8 feet in diameter, working at 40 revolutions per minute, gearing with a pinion, requiring a large amount of pressure to transmit 100 indicated horse-power. This system of gearing seems to be thoroughly adapted both to heavy and light machinery ; and wherever there is liability to sudden concussion or strain they are invaluable, since, from their very principle, it is evident that they cannot be damaged. In case of a sudden jerk, a slight and immaterial slip is the sole inconvenience, the wheels being left in quite as good order after the jerk as they were before, instead of, as would be the case with ordinary gearing in use, broken teeth having to be repaired before the working could be continued. The smoothness with which the frictional gearing works is remarkable. Some of the wheels upon this system have been in use many years, and continue to give the greatest possible satisfaction ; and it is considered that where the wheels are properly proportioned to the work to be done, they are more durable and transmit power with less waste by friction than is incurred by using toothed gear.

HAMILTON AND ASHTON'S ICE-CREAM FREEZER.

The accompanying engravings are representations of an improved machine for freezing ice-cream, recently patented by Messrs. Ashton & Hamilton, of Jacksonville, Ill. It is outwardly similar in appearance to the freezers now in use, having a wooden tub which holds the mixture of salt and ice and the can containing the fluid to be frozen ; the internal arrangements differ materially in their action, the inventors state, from any others in use. A, is the outer case ; B, the tin can or freezer ; and C, the knives which agitate the congealing mass revolving with the frame or paddles, C^2. Across the top of the tube, A, runs a cast-iron shaft confined in light bearings of the same material ; upon this shaft the gear wheel, *a*, is secured, which meshes into the wheel, *b*, upon the freezer, B, in the tub below ; a second series of teeth are cast upon the wheel, *a*, which connect with the knives through the medium of the small pinions, *c*, and c^2, upon the shaft *d*, which runs in a center at the bottom of the freezer, B. These are all the different parts, the operation of them is very simple. Upon turning the handle, *e*, a rapid rotation of the freezer, the paddles, and the knives ensues ; their motions are not coincident, however, but in a contrary direction to each other, so that a thorough separation of the cream occurs and all parts are brought into contact with the cold. The relative position of the agitators or knives is also important, as the cream in passing through them acquires a slightly vertical motion, which, in connection with the rapid revolutions of the freezer and paddles in opposite directions, tends to mix the cream thoroughly and make it homogeneous in character throughout, thus producing that smooth and buttery variety of this luxury which is so difficult to attain and which is thought to be a great virtue in it. When the ice-cream becomes so congealed that it is difficult to turn the knives, C, a small bolt must be withdrawn from the shaft which works the knives, and they then remain stationary while the paddles revolve ; if the latter operation becomes too laborious, the pinion, c^2, must be withdrawn and the freezer B, is alone revolved, the other parts turning with it. When it is desired to take the cream out, a common case knife passed down the sides of the knives and paddles readily separates it, or it may be left in the tub for any length of time.

This seems to be a very useful machine for the purpose and one which will materially facilitate the congelation of creams.

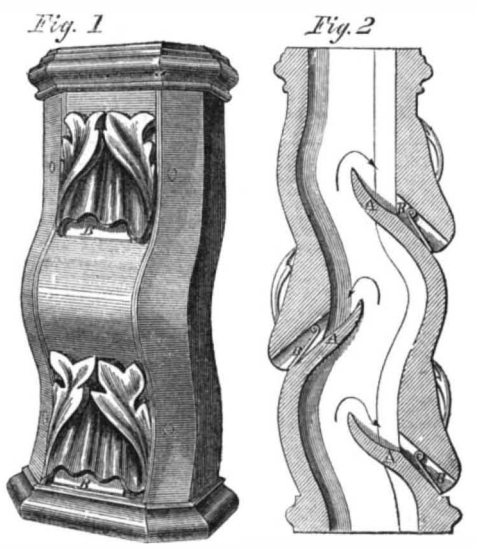
Fig. 1



The patent for this invention was procured through the Scientific American Patent Agency, Nov. 11, 1862, and further information in relation to it may be obtained by addressing the inventors, Messrs. S. H. Hamilton and C. A. Ashton, at Jacksonville, Ill.

ELBERG'S CHIMNEY CAP.

In rainy and windy weather much inconvenience is felt in some localities by the counter-currents and moisture which descend chimney flues, preventing in a great degree their satisfactory working ; our engraving represents a device for obviating the above disagreeable features, designed by Mr. George Elberg, of Cincinnati, Ohio. It consists in so disposing a series of projecting curved shelves, A, or wings, running across the flue and extending upward, with such relation to each other that a line drawn through the center of the flue would strike a point a little back of their front edges. These shelves are placed on each



side of the chimney internally, and are continuations of passages which are made through the chimney wall ; in each of the passages, a valve, B, is hung, opening outwardly. It will be apparent that all the rain or snow which descends the flue will be caught by one or the other of the projecting shelves, and discharged on the roof through the valves, B ; and by the same means the back draft, which would otherwise blow down the chimney and fill the house with smoke, is arrested and diverged through the plan described.

This cap is outwardly ornamental in appearance, and would seem efficient in operation. Application for the patent is now pending.

For further particulars, address Mr. George Elberg, at 395 Broadway, Cincinnati, Ohio.

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